The Builder.

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The Proposed Amendments of the Metropolitan Building Acts.

IT had been generally anticipated that the London County Council would at an early date propose some changes in the Acts regulating buildings in the Metropolis. They have chosen a mode of doing this which appears, as we have already noted, to be open to some objection, as the proposed amendments appear in the form of a group of clauses in a "General Powers Bill,"* and thus may escape the attentive scrutiny they ought to receive. The amendments sought to be introduced are fragmentary and disconnected, and in several cases are directed to remedy defects or deficiencies which have been found in the more recent Acts rather than in the Act of 1855.

This piecemeal legislation is not thorough, and can hardly lead to much durable benefit, and though it undoubtedly may apply a remedy to certain immediate evils, there are other points towards which attention might with equal advantage have been directed, and which may, we hope, be dealt with hereafter.

Two clauses, singularly enough not connected in position, refer to the function of the Superintending Architect as the authority for fixing lines of frontage. By one of these (67) he is directed to deal with corner-plots,—that is to say, in fixing the line of frontage in a street where, hereafter, a corner-house will have to be built, he is to determine the line of frontage to the second street on which such house will also abut, and the line so determined is to be binding upon the persons who hereafter build in such street. This will, it is true, dispose of some vexed questions as to corner-plots, but it will seriously increase the responsibility of the Superintending Architect, as in some, at any rate, of such cases he will be compelled to fix a line of frontage without being able to have the advantage and assistance of having the persons who hereafter may become interested in the property before him, and hearing what they have to say.

The other clause (No. 61), which will in some cases be of essential service, will not relieve the Architect in such a case as the above. This is a clause requiring the Architect's decision to be notified to the Vestry or District Board and the adjoining owners, and giving a right of appeal within fourteen days. Probably the most important of all the proposed changes is the establishment of a new tribunal which is to hear these appeals, and which is to consist of three persons, one to be appointed by the County Council, one by the Royal Institute of British Architects, and one by the Institution of Surveyors. Not only is such a tribunal likely to dispose satisfactorily of any appeals that may be raised, but we hail its appointment as possibly a first step in a direction towards which an improvement is urgently needed to be directed. If the establishment of this tribunal for frontage appeals should prove the first step towards the constitution of some Court or Court of Appeal where all important technical questions, arising under the Building Act, could be heard and reviewed, it will be, indeed, an amendment in the best sense of the word. The greatest difficulties in the administration of the Acts governing building in the Metropolis, rise out of the uncertainties and the conflicting decisions in the existing tribunals of the Police Magistrates' Courts.

A useful power is proposed to be conferred on the County Council by Clause 62, under which it can consent to the erection of business premises of greater cubic contents than the present limit. This alteration, or something like it, has been proposed before, and met with determined opposition from the Insurance Companies, but it would be of great advantage to manufacturers and others if the proposed powers were given, supposing always that they were liberally and prudently administered.

Two clauses, again disconnected in position, refer to the width of roads and setting back of frontages. In order, apparently, to correct an oversight in the Act of 1878, the Council seeks to obtain under Clause 63 a power arbitrarily to fix "the centre of the road," and under Clause 68, to inflict penalties for infringing a frontage line of 20 ft. in case of a carriage-way, or 10 ft. in case of a footway from such centre as was prescribed in the 1878 Act. Apparently the object in re-enacting the penalties may be to get rid of a process of giving notice to offenders which, under the enactment just quoted, has to be gone through. There is room for doubt whether this provision, as it stands in the Bill, would be found quite workable; and there certainly is room for more than doubt as to the propriety of arming the County Council with an arbitrary power of fixing what shall be the centre of the roadway. Surely the defects in Clauses 4 and 6 of the Act of 1878, which do not, it is admitted, fully carry out the intentions of the framers of that Act, might have been carefully amended without so drastic a remedy as this.

Another clause, No. 69, gives control to the Council over carriage-ways which will not directly communicate at both ends with a public carriage-way. This appears substantially to extend to carriage-roads the provisions of Section 7 of the Act of 1882, which apply to laying out a road for building. It may be expected that land-owners will resist this enactment. Many of them are already much hampered by the operation of the Act of 1882 just referred to, and this will add materially to their grievances. It is true that in the clause which enacts this regulation it is proposed that there shall be an appeal to an arbitrator chosen by one of the Secretaries of State. Could this right of appeal be with advantage extended to decisions as to roads laid out for building it would probably be of more service than when confined to roads for communication only. A man who wants to drive a road through his estate that is not intended to create building frontages, does not, as a rule, care for an expensive and tedious tribunal.

The other provisions include one (No. 60) as to the form in which the approval of plans is to be given; one (No. 65) prohibiting the turning of buildings erected for private purposes into public buildings without the previous consent of the Council; and one (No. 66) enforcing notice to the authorities before pulling down, as well as before erecting, any building within 30 ft. of any public thoroughfare, and the erection of a proper hoarding, platform, and handrail. About these there is not much to be said; but there remains a provision in Clause 70 of more serious importance, one which will strike a blow at the erection of houses in flats and other developments of building, and which probably will be fiercely opposed. It is proposed to enact that no building, after the passing of this Act, shall be carried to a greater height than 70 ft. from the pavement without the consent of the County Council, under a penalty of £100. The 70 ft. are to be computed up to the top of the parapet if there is one, or the top of the wall if there be no parapet. Surely, it would not have been impossible to devise some reason-

* For the text, see the *Builder* for Dec. 14, 1889, p. 421.

able rules as to lofty buildings without making each one of them a special case for the consideration of the Council.

So far the various clauses state definitely what it is intended to do, but there remains one (No. 64) in which the precedent of the Act of 1878 is followed, and the Board is authorised to proceed by way of by-laws in regulating certain questions, though we fail to find the clause which that Act contained requiring the by-laws, or any variation of them, to be sanctioned by a Secretary of State before they acquire the force of law, and to be notified by advertisement before they obtained the force of law; but, instead thereof, the sections of the Metropolis Management Act of 1855 which relate to the making of by-laws are incorporated. These sections do not so fully safeguard the public against surprise or hasty enactments. The subjects upon which this legislation by means of by-laws is proposed are the materials used in plastering, and on the sites of buildings for 3 ft. round the building, and what they may be filled up with, and the duties of District Surveyors in respect of these matters. Legislation by means of by-laws is not a desirable course to pursue, and surely in so very simple a matter as this it would not have been difficult,—would not now be difficult—to draught a clause setting forth exactly the nature of the proposed amendments as the Council desires them to stand.

We have now touched upon all the clauses, and we are tempted to express our regret that they should be, one and all, of the nature of stop-gaps; they are eminently specimens of piecemeal legislation, but in one thing—and apparently one only—they are consistent. Each difficulty is to be referred to the County Council. This we also regret. There is no proper machinery in a large, overworked and overweighted public body for giving the due consideration to individual appeals, and the true wisdom would have been to make the various amendments as perfect as skill and experience could suggest, and there to leave them.

The appellate jurisdiction of the Metropolitan Board gave rise to much that was undesirable, and it is most unfortunate that its owners should be seeking to extend instead of, if possible, to contract it.

One other question forces itself on our notice. Why were these points specially selected for amendment? We had hoped that some attempt might be made to render the Building Act a little more favourable to architectural design as developed at the present day; that some more scientific definition of the materials to be employed in fire-proof staircases and passages might be introduced, so as to favour fire-resisting construction; and that, perhaps, some provisions for the protection of iron employed as columns, &c., from the action of fire and water, might have been made.

We fear the present Bill can hardly be looked upon as an instalment of a well-considered scheme of reform; and were it not for its provision of an appeal court in certain cases, which we heartily welcome, it could hardly be considered anything better than a hasty attempt to do something in order to redeem platform pledges.

Edwardian Architecture.—Mr. B. Priestley Shires, past hon. sec. of the York Architectural Association, delivered a lecture on "The Domestic Architecture of the Edwardian Period" on Wednesday evening last, in the large lecture-hall connected with Batter-street Church, Plymouth. The lecturer spoke at length on the historical and literary references to the subject, and alluded to the arrangement and plan of Edwardian houses and castles, to the furniture, tapestry, manners, and customs of the time, windmills, water-mills, and public roads of the period. The lecture was illustrated by drawings and sketches.

Architectural Exhibition in Stockholm.—During next summer an exhibition of architectural drawings is to be held in Stockholm, with the view of collecting all designs of buildings offered for competition in Sweden during recent years.

ABOUT SUNDIALS.

At the present day whatever interest is felt in the sundial is one of a purely sentimental kind. For many centuries, no doubt, it was a recognised practical way of recording time, and was regarded as a purely practical scientific instrument for that purpose. The modern perfecting of mechanical means of registering the passage of time has long since removed the dial from its place of honour as a clock, although certain special applications of sun-shadows can still be found useful, as noticed and illustrated in Sir E. Beckett's (Lord Grimthorpe's) work on "Clocks and Watches," for obtaining true time from the sun at noon, for the benefit of those "who cannot or will not undertake sidereal observations." The two systems mentioned in the work referred to are the "meridian dial" by which a thin slit of light is thrown on an ascertained and marked spot on a slab, at noon; and the much more scientific instrument patented by the late Mr. Bloxam, a barrister, called the Dipleidoscope. This consists of an arrangement of three pieces of glass, two of them mirrors, in the form of a triangular box, the two mirrors being so arranged that a double reflection of the sun is seen at all times except at meridian noon, when the two images coincide. The adjustment has to be made with a chronometer in the first instance. This may be said to be a kind of stationary sextant, reading true always for the permanent position in which it is first adjusted.

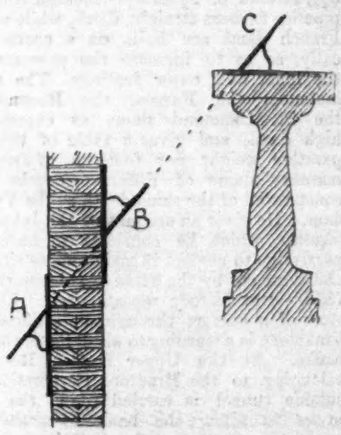
Both these however differ in principle from the sundial proper; the latter obviously so, the former in the fact that the angle at which the upright bearing the slit is fixed is a matter of little importance, provided the slit face south; it is supposed to be fixed upright, but might vary its angle in the plane of north and south without affecting its use, provided no movement takes place after the adjustment is once made. A simple and scientific method of making the adjustment is described in Lord Grimthorpe's book just referred to. The essential difference in the sundial consists in the fact that it measures time by a shadow passing over equal angles in equal times, and that to effect this the gnomon which casts the shadow must be fixed at a special angle which, in regard to the earth's surface, varies with the latitude. The shadow of an upright gnomon, unless it were fixed on the earth's pole, would travel over different angles in equal times, at different parts of the day. To produce an approximation to correctness (for various reasons and in various ways it is not more than an approximation) the gnomon must always be fixed parallel to the earth's polar axis. Theoretically, indeed, it could not be perfectly true in its registering except when in the position of being a continuation of the polar axis itself; but the difference caused by the distance from the earth's axis is too infinitesimal to be taken into account, in relation to the distance of the earth from the sun; and the gnomon, when fixed parallel to the earth's axis, may be regarded, in relation to its function, as on the axis.

The interest which the sundial has had for many minds, in many generations, is perhaps in great measure owing to the fact that, though confessedly imperfect, it is a measure of time carried on not by any machinery of wheels and springs or weights made by human hands, but by the great mechanism of the solar system itself, a mechanism with which no human force can intermeddle. It is the sense of the relentless movement of this silent shadow marking away the hours that has probably tended to render mankind so disposed to moralise over the sundial, and to decorate it with a multiplicity of mottoes, many of which are collected for us in Mrs. Alfred Gatty's beautiful volume, "The Book of Sundials,"* and the bulk of which, in their weighty and even solemn tone of thought and suggestion, give ample and very interesting evidence of the impression which the sundial has made upon men's imagination. Apart from this moral interest of the subject, which is in its nature perennial, there is no doubt still an interest attaching to the construction of sundials in another sense, as a means of putting oneself practically *en rapport* with the movements of the sun and the earth; and Mr. W. Richardson, who has written the appendix on the construction of dials to Mrs. Gatty's book, observes that "if any youthful reader will take the trouble to construct a sundial it will teach him more astronomy than a course of popular lectures can afford him." But we rather question whether the writer has taken the best and clearest method of illustrating the practical part of the subject. One or two minor points are in fact inaccurate, and tend to make the student mistake accidentals for essentials. In relation to his diagram fig. 3, for instance, which gives the plan for the setting-out of a dial-plate on a horizontal square table, he says "draw a square or rectangle, and down the centre draw a perpendicular line PS. On the left of this draw a parallel line and make its distance from PS equal to the thickness of the gnomon. This double line is called the substile," that is to say, since the gnomon has a certain thickness, a central blank must be left under it on the dial-plate, corresponding to its thickness, and the setting-out of the hour-lines must be made on each side of this space. But to direct the student to commence by drawing a *centre* line on the plate, and then marking off a parallel one to the left of it, is to start him with an error which will get the "substile" space out of centre on the plate. The diagram itself, we observe, is correctly drawn, but the description of how to set about it is wrong at the outset. He should have said, draw a central line, and on each side draw a parallel line, the space between the two representing the thickness of the gnomon; or, which would have been still better, the setting-out should have been made from a central line, assuming the gnomon to have no thickness (as indeed the writer suggests in the demonstration of another figure); when the setting-out of the hour-lines is complete, it is easy to reproduce it, substituting a double line with a space between for the central line—in other words, pushing the two sides of the dial-plate asunder and inserting in the centre a blank slip representing the thickness of the gnomon. Again, at the conclusion of the demonstration how "to construct a horizontal sun-dial for the latitude of 54 deg.," we are told "the gnomon will be a right-angled triangle, having one angle of 54 deg. at O, and placed on the substile O XII." This may be only *façon de parler*, but it leads the student to think that the triangular shape of the gnomon is essential, whereas the only essential part is the side subtending the imaginary right-angle. Gnomons constantly have been made of a triangular shape, because it is an easy and simple way of making them strong and seating them firmly in their position; but this shape is a mere constructive matter, the only part essential to the function of the dial is the upper edge at an angle of 54 deg. (or whatever other angle the latitude may require). And in adopting the rather complicated methods of demonstration and setting-out apparently taken from Leybourn, the author has given a good deal of mystery and apparent difficulty to what is really a simpler problem than the student would gather from the pages of this "appendix." As Mr. Richardson refers to the definition of the subject in Mr. Norman Lockyer's "Elementary Lessons in Astronomy," it is to be regretted that he did not adopt the beautifully simple and logical definition there given of the principle of the sundial, by far the best and clearest we have ever seen. It cannot perhaps be fully realised without Mr. Lockyer's diagram, which is to be found on page 192 of the "Elementary Lessons,"* but he explains the matter thus: Suppose we had a transparent

* The Book of Sundials: collected by Mrs. Alfred Gatty; new and enlarged edition, edited by H. K. F. Gatty and Eleanor Lloyd. With an appendix on the construction of dials, by W. Richardson. London: G. Bell & Sons; 1889.

* Published by Macmillan & Co.

cylinder with an opaque axis, both axis and cylinder parallel to the axis of the earth. Let us draw down the surface of the cylinder parallel lines at equal distances of 15 deg. of the circumference of the cylinder, and place a dial-plate in the cylinder in contact with its sides, and let the opaque rod pass through the centre of the dial-plate; the sun would cast the shadow of the rod on the dial, and whenever the end of the shadow coincided with one of the hour-lines on the surface of the cylinder an hour would be marked. The dial-plate might be put in any position in the cylinder; if at right-angles with the axis it would be a circle, if otherwise, an ellipse, but the hours would be marked just the same. Now that is what all the sundials in the world are,* in whatever position and in whatever latitude; they are dial-plates strung on to an imaginary rod which is parallel to the earth's axis, and of which the gnomon of each is the portion of the rod there visible. If the editors of the present edition of the work had realised this they would hardly have made the observation they have made (page 317) in regard to the dial on the north side of Market Deeping Church, that the gnomon "instead of being parallel to the axis of the earth is placed in an exactly opposite direction on account of the unusual aspect of the dial." We have not seen the dial in question, but we presume what is meant is that the gnomon inclines upward instead of downward; but it is still parallel to the axis of the earth. As Leybourn says, when you have set out the dial for a vertical face looking due south, you have set out two dials, "for the north dial is but the back side of the south." Suppose, in the accompanying sketch, A represents the angle of the gnomon for a vertical dial-plate facing south, for a given north latitude. If we erect another dial back to back with it on



the north side of the wall (B), the angle for that gnomon will be the line of the south dial gnomon carried through the wall, as shown by the dotted line. And if we produce this line further we can show it at C as the gnomon for a horizontal dial-plate for the same latitude, a pedestal dial. All the three gnomons are only visible parts of an imaginary continuous line parallel to the earth's axis. If we imagine it changed to a similar degree of south latitude, the position of all the gnomons will be reversed; that is to say, they will appear to be so in relation to the earth's surface. At the equator the gnomons would all be horizontal, or parallel to the tangent of the earth's surface. Thus the theory of the sundial is really the very simple one of getting a rod parallel to the axis of the earth, in the centre of a circular disk, the surface of which is divided off into hours (*i.e.*, spaces of 15 deg.) by lines radiating from the centre, and then projecting those divisions on to whatever other plane is required by the circumstances.

If there is some scientific interest in the construction of the sundial, there is certainly much about it also to interest the artist and the architect. The many old sundials still remaining are always welcome objects both from their often picturesque forms and from the memories and associations that cluster around them of days when time was not money, as it is now said to be, and when these less accurate methods of measuring it were sufficient for the needs of life. But there is a great deal to be said in favour of not letting the sundial die out. It affords an opportunity for giving an added interest to some point in a building which might otherwise be left blank, or for making a pleasing decorative centre in a garden. The various methods of treating it architecturally have been by no means exhausted; on the contrary, there is a good deal of room for new invention and fancy in the designing of sundials, and the subject and its associations are certainly suggestive enough.

We have left ourselves little space to speak of the mottoes which form the main subject of the book which chiefly suggested these remarks. These are 738 in number, with twenty-one more added as "addenda," the place from which the motto is taken being in all cases given. To go at all in detail into these would lead us perhaps a little too far afield. But we cannot help remarking upon the wonderful amount of moral and poetic suggestion to be found in the mottoes thus collected. Some of them, no doubt, are among the commonplace moralities about the lapse of time and the uncertainty of life; but many are really striking and powerful, and none the less so when expressed in Latin, that terse yet refined language which seems made for inscriptions and proverbs of grave import. The beautiful one "Horas non numero nisi serenas" occurs in several varying forms; it is one of the expressions of a feeling which the sundial seems to have awakened in many minds, as to the significance and value of light, moral and material. "Sol me, vos umbra" ("the sun guides me, the shadow you") is a reflection of a different cast but with a similar origin. "Now or never" and "Now is yesterday's to-morrow" are among the examples of sturdy moralising in the mother tongue; of which a still more forcible instance perhaps is that from Leventhorpe Hall, — "Time can do much." These, however, are only a few examples out of a great number of inscriptions equally characteristic and suggestive. It should be added that the volume containing them is produced in admirable form, and that both for its matter and its manner it is a book that should be welcome to all those (to vary Milton a little) "who in trim volumes find their pleasure."

* All, that is to say, which are constructed with a plane superficies for the dial-plate. There are exceptional forms, such as the concave hemisphere on which the shadow of the rim is thrown, which do not come into the same category.

NOTES.

THE London sewage problem has been prominently brought forward this week,—firstly at the meeting of the County Council on Tuesday, and secondly by Sir Robert Rawlinson in his paper at the Society of Arts on Wednesday evening. As will be seen by our report of the meeting of the County Council, a proposal to build two more sludge ships was rejected, evidently owing to the lack of faith which prevails in the Council as to the efficacy of the costly and complicated precipitation works which have just been completed at the Barking outfall and are still in progress at Crossness. We have from time to time described the progress of these precipitation works, which will cost about a million sterling before they are completed, and we have not hesitated to express the opinion that they are destined to fail in effecting the object aimed at,—an opinion shared by many eminent engineers and chemists. Sir Robert Rawlinson, in his paper read before the Society of Arts, likens the works "to an entire herd of white elephants" bequeathed by the late Metropolitan Board of Works to the London County Council, and he declares boldly that "these abortive works" "must and will be abolished." For his own proposals we must refer our readers to the portion of the paper which we print. His views coincide with those of some of the speakers at the meeting of the County Council. That body has decided to make further inquiry into the question before incurring additional outlay for sludge ships, and to make temporary arrangements for the removal of the sludge. The Main Drainage Committee have been instructed to secure the services of "an eminent civil engineer" to be associated with the Engineer of the Council in the inquiry.

THE London and North-Western Company completed their case before the Board of Trade last week, after fifteen days sitting, the next step being the opening of the case of the Associated Companies by Sir Henry James. The increasing prospect of a prolonged inquiry brought forth a proposition from Lord Balfour of Burleigh, whereby the Court would take the cases of traders wishing to effect changes in the classification, and the railway companies who defend the present position, in a manner that would prevent any great waste of time and money. His lordship suggested that it should be done by taking so many sets of articles a day, and only summoning those to attend who are interested in such particular articles. All those affected would thus have an opportunity of being present, while others would be relieved from unnecessary attendance. The chief Goods Manager of the North-Western, in the course of his remarks opposing exceptional rates for 10-ton trucks, made a rather noticeable statement. He said that the cost of working a full train was very much the same, whatever the load in each truck was. This appears to contradict what we have been accustomed to hear from our railway officials as to the way in which they are handicapped in comparison with other countries in this very matter of full-truck loads. Mr. Harrison should have been asked for a definition of a "full train." Mr. Henry Lambert, who succeeded the late Mr. Grierson as General Manager of the Great Western Railway, was the first witness examined this week on behalf of the Associated Companies.

WE understand that an attempt is at last to be made to deal with the sewage of Glasgow, which still finds its way by a score or more of different conduits into the Clyde, modified not in the slightest from its maximum filthiness any more than it ever has been, although the subject has been talked of more or less earnestly for the past quarter of a century. The building of the Glasgow Central Railway and the Bridgeton extension of the North British city system (both underground in character), are about to necessitate a wholesale diversion of the main sewerage lines of the eastern quarter, to be carried out at the cost of the invading railway companies, and, instead of several outfalls into the river, with only one place of discharge, at a point rather above the city boundaries. This will affect only about one-fifth of the area of Glasgow, and, as the waste ground surrounding the proposed outfall is already public property, it is the design (avowedly in the character of a mere experiment which in any case cannot run to a very important outlay) to employ this now unutilised riverside patch for the systematic cleansing of the effluent sewage liquid in tanks and otherwise before permitting it to escape into the river. Systems and methods of purification, as yet, are only in the stage of discussion by the members of the committee of Town Council in whose hands the operations rest; but it is understood that chemicals will have an opportunity of showing what they can do; as also filtration and sedimentary action, to an extent sufficient for deductions as to practical usefulness. The population of East Glasgow whose drainage is thus to be experimented on will amount probably to rather over 200,000, but the precise boundaries have still to be marked out.

THE strike of the gas-stokers at Manchester and Salford scarcely received the attention in London which it deserved. In many ways it was an event of much more than mere local importance. It differed essentially from ordinary trade disputes, since it was a struggle not between capital and labour, but between labour and representative local government. It was not an attempt on the part of labour to get a larger share of the profit of capital, but to make the public and the local community pay more than the current and necessary rate of wages to a particular class of workers. There are few who do not sympathise more or less with the efforts of working men to obtain a larger share of the profits of the capitalist, but no one can sympathise with an attempt such as was made at Manchester. In many respects it was an attempt to set up the principle which underlies Protection—namely, that one particular class should be benefitted at the expense of the whole community. Light is a prime necessity. It is for the benefit of the whole community that it should be supplied as cheaply and as efficiently as possible, and it is the duty of the representatives of a locality which manages its own lighting to put as small a burden on the ratepayers as possible. The Gas Committee were therefore bound to resist the gas stokers; they would have been guilty of a breach of duty if they had done otherwise. But it showed a lamentable want of sagacity on the part of the leaders of the men that they failed to recognise the vast difference between a struggle with a number of capitalists and with a representative local body. They fell into the error of trying to benefit one class of workers at the expense of the whole community, a principle which when the Corn Laws were abolished received its death-blow in this country. Not only was it an attempt to resuscitate this principle, it was also flavoured strongly with Socialism, because it was advanced that the public should share their money with the gas-stokers, not because the latter did more work or because the general rate of wages had risen, but because the gas-stokers had not as high wages as they wished. That the attempt failed is fortunate. If it had succeeded it would certainly have been followed by others, and thus the general community would have suffered from a general increase of the rates.

THE new volume (vol. v., new series) of the Transactions of the Institute of Architects fully keeps up the high standard of interest, both in regard to matter and illustrations, which has distinguished the "New Series" of these volumes. Mr. Belcher's paper on "Musical Requirements in Church Planning" gains new value by some admirable illustrations of existing church organs and plans and sketches of his own proposed arrangements. Professor Aitchison's paper on the "Roman Thermæ," with the plans accompanying it, is a contribution of permanent value to a subject of the greatest archæological and architectural interest. The paper is further illustrated by a phototype of the late Professor Cockerell's view of a restoration of the Tepidarium of Caracallas Thermæ; the same drawing which we had the pleasure of publishing, to a rather larger scale, in the *Builder* for March 23 last. Mr. Percy S. Worthington's prize essay on "Five Famous Domes," with a number of illustrations, is also a very interesting and useful *resumé* of a great subject. Some of Mr. Roland W. Paul's sketches during his Pugin Studentship tour in Hampshire and Somersetshire make a very pleasing addition to the volume. But a feature of special importance is the re-publication of some of Street's early contributions to the Institute meetings, which have been long out of print, and are now reprinted with *facsimile* reproductions of various sketches by the same hand. The subjects of these reprinted papers are "Some Churches in Le-Puy-en-Velay and Auvergne"; "The Church of St. Michael Penkevel, Cornwall"; "English Woodwork in the Thirteenth and Fourteenth Centuries"; and "Some of the Differences of Style in Old Buildings."

IN *L'Architecture* for Dec. 14 is a long illustrated article by M. L. C. Boileau *fils* on "le Rationalisme Gothique et la Raison Classique," which is mainly concerned with the logical form of treatment of the capital or impost in relation to the arch or vault lines springing from it. The conclusion M. Boileau comes to is a sufficiently surprising one, and in direct contradiction to the criticism of Fergusson and other modern English writers on the Roman treatment of the impost. That the springing of the vault should oversail the width of the column he admits as an architectural necessity; the Mediæval architects however, he thinks, made the double mistake of overdoing this and of placing between the shaft of the column and the springing of the vault only a weak-looking carved capital or, as he calls it, corbel. If the capital were treated in such a manner as to have the requisite appearance of strength and weight for the springing of the vault, it must become in itself heavy and clumsy. Now, says the French critic, Classic architecture solves the problem exactly, inasmuch as, in the first place, it reduces the over-sailing of the arch-springing to the square described about the exterior circle of the plan of the column, so as to have no over-sailing effect except in an angle view, and by inserting beneath the arch a square mass of entablature, it forms "the most logical transition that can be imagined between the column and the arch-springing." By this means, we are told, we can unite "la fermeté de l'abaque à l'élégance de la corbeille fleurie"; and he adds, "il est impossible d'imaginer une solution plus correcte" (!) All which seems to prove that in architecture, as in other spheres of human action, there are no favourite sins for which a hardened conscience will not invent a justification.

THE case of Myers *v.* Catterson, of which a report will be found in another column, adds to the mass of light and air law. It is quite unnecessary to go into all the facts which were brought out before the Court of Appeal; it is sufficient to say that the litigation was raised on the question to what extent a railway company could obstruct the light of an adjoining house, which had been built on surplus land sold by the company. Shortly stated, the rights of the grantees are the same against a railway company as against any other grantor, with this limitation: that the company may interfere with the light so far as such interference is necessary for the construction and working of their railway. In the case before the Court, openings in railway arches, through which the light passed, were blocked up with hoardings. These the Court held were not necessary for the construction and working of the railway, and the plaintiff therefore had a right to have them removed. A railway company would, however, clearly be wise to contract expressly, when surplus land is sold, against any implied grant of light. Railway arches, for example, are of pecuniary value, and a railway may lose a source of profit if they cannot be closed and used as buildings.

IN the *Times* of Thursday Mr. Vian, the Secretary to the French Asphalte Company, makes a rejoinder to the protest entered by the Horse Accident Prevention Society, through a deputation to the Commissioners of Sewers, against the dangers of asphalte pavements. Mr. Vian contends that the slipperiness complained of in asphalte pavement is due to its not being properly cleansed, and that the fault lies with the dirt and not with the asphalte. There is unquestionably a certain amount of truth in this plea, but at the best we fear it cannot be contended that asphalte, even when wet with fresh rain only, and before mud has formed, is not a slippery and risky pavement for horses. We quite agree with Mr. Vian that it has important sanitary advantages over wood pavement, and on the whole we are inclined to believe it is the best town pavement yet used in England, taking them all round; but the distress it often occasions to horses is a real evil, and one not to be entirely got over, we fear, by any amount of cleansing. In connexion with the suggestion, we may call attention to the fact noted in a paragraph in this journal last week, that india-rubber paving is said to have been successfully used as an experiment in Berlin and one or two cities; that it is noiseless and not slippery. We have as yet no technical details in regard to it, but it may be worth further inquiry.

WE have received a printed copy of a paper upon "Earth and Masonry Dams," recently read before the Liverpool Engineering Society by Mr. George Farren, Assoc. Mem. Inst. C.E., in which the author deals principally with the Vyrnwy masonry dam, and expresses the opinion that the Vyrnwy section is safer than either Rankine's section or the more modern Quaker Bridge dam. He calls attention to the precautions taken to secure cement strong enough to resist crushing, all the cement used in this wall or dam having been exposed to the humid atmosphere of a room for ten to fourteen days in thin layers prior to use. An apron also is constructed at the toe of the dam to protect the foundation by receiving the surplus waters of the Vyrnwy lake as they fall over the central portion of the dam, which acts as a weir for the bywash of the reservoir. Lake Vyrnwy is deep enough to keep the water cool, and is so situated that the water is kept constantly susceptible to the oxygen of the air by the action of prevailing winds maintaining the surface in motion. The Vyrnwy dam, the author states, has enormous strength, the factor of safety being $5\frac{1}{12}$, instead of $2\frac{1}{2}$ to $3\frac{1}{4}$. Modern American practice favours straight dams, while modern French dams are built on a curve vertically, so as to increase the pressure upon the inner and outer footings. The author instances the Furens, the Roanne, and the St. Chamond dams as examples of high dams, and gives a table of the comparative weight per foot-run of nineteen masonry dams of different depths when constructed of the same depth as the Vyrnwy dam. He gives an account of the Johnstown disaster, which he considers to have been partly due to neglect in maintenance since the abandonment by the State of this reservoir in 1858. But history repeats itself. The old story of a culvert through an artificial embankment is a warning to all designers of high banks. At the Upper Barden Reservoir, belonging to the Bradford Corporation, an outside tunnel is carried round the bank, so as to allow the bank to settle independently of the outlet. Opinions differ respecting the stability of dams, and we regret than an account of the discussion upon this paper does not accompany the pamphlet. The author includes some valuable remarks upon clay as used for puddle, its chemical nature, and the action of water upon it. He also mentions a reservoir at Blaenau Festiniog, North Wales, containing a dam which is reported to be perfectly watertight, formed of two stone walls 4 ft. apart, in which hydraulic mortar to the joints extends only 15 in. upon both sides, the interval between the two walls being filled up with layers of peat of a purely fibrous origin throughout the entire length of 200 ft. and depth of 33 ft., the whole of the rest of the walls being dry, squared, irregular stones, with a layer of peat, puddle, and gravel upon the inner face of the dam.

IN the December number of the *Portfolio* the papers on Westminster Abbey by Mr. Loftie, with Mr. Railton's beautiful illustrations, are brought to a close, or so we gather from the wording of the last paragraph of the article in this number. The illustrations to the final number are a view in the nave of the Abbey, a view in the choir, a sketch of a door in the cloisters, an exterior sketch of the apse, and

a view of the corner containing the Dryden monument (the latter a process-block from a photograph). We hope these articles and the illustrations will be published as a separate work, which would make a beautiful illustrated monograph of the Abbey—for *popular* reading, be it understood; architectural students would hardly find it of special value, except that Mr. Railton's drawings are admirable models of picturesque and effective architectural sketching.

THE collection of the works of "London Impressionists" which has been on view for the last week or two at the Goupil Gallery shows the usual characteristics of collections of this kind, producing an "impression" of a keen perception of effects of air and light and tone combined with an absolute indifference as to accuracy or definition of detail. The very first drawing in the order of hanging, "The Marble Arch," by Mr. Sidney Starr, includes a supposed representation of the Marble Arch which does not contain the slightest suggestion of its real architectural form, and no one could tell what it was meant for but for the title. Mr. Francis E. James's sketches, especially that entitled "Uddimore" show great truth of perception as to colour and light, and as sketches of effect they are very good; but there is neither detail nor texture indicated, and to produce an aerial effect when all detail is omitted is, we are disposed to think, not so difficult a task as impressionists would have us believe. Mr. G. Thomson however has missed it, in "Kew Gardens" (22), which is full of very strong colour with no light or atmosphere at all. In "A Spring Evening in the Row" (25) he has got an effect of light no doubt, but look at the horses! If that is the "impression" horses produce on Mr. Thomson's retina, we can only be glad that they never produce that impression on ours. Other drawings in the collection, such as Mr. F. Brown's "On the Pier, Morning Sunlight" (42) and "Walberswick Church" (46), and Mr. Maitland's "The Three Public-houses, Morning Sunlight" (49), show effects of light, with no trouble about drawing anything properly or definitely. In fact, this is a collection of promising but unfinished pictures, that is all.

WE some time since received some specimens of indelible ink manufactured by Mr. O. Percival, of Manchester. One sample styled "Engineering Fluid," is intended for general office work, and is said to be photographically opaque to white light. Another example is an "Indelible Brown Ink," said to become indelible the moment it is dry. We have tested these inks in use for some little time, and find that they appear to possess all the merits claimed for them, with the exception that the brown fluid is not absolutely indelible until several hours after use. Both samples tested are slightly too fluid to be used quite comfortably with a ruling pen, and are apt to run into blots at the ends of lines. The black ink is not absolutely black in very fine lines, but owing to the ease with which it runs from the pen a line of moderate thickness is so. The colour of the brown fluid is not as good as that of several indelible brown inks. Neither ink has faded in the course of about four months.

IN an article entitled "A Farewell to Grey Friars," we adverted, on Oct. 10, 1885, to a scheme made by the Charity Commissioners for dealing with Christ's, or rather Christ, Hospital, more popularly known as the Bluecoat School. Slightly modified, that scheme was re-issued by the Commissioners about eighteen months ago, and approved by the Education Office. Having been opposed at various stages by the Governors and others, it was finally referred, upon appeal, in June last, to the Judicial Committee of the Privy Council. On Saturday, 14th inst., the Lord Chancellor delivered a judgment which, in effect, ratifies all the proposals of the Commissioners except as touching the conscience clause introduced under the Endowed Schools Act, 1869, and the scheme will be remitted for correction in this particular forthwith. A new governing body, to be set up by the scheme, are charged to provide fresh sites and buildings, and to fit out a boarding-school for 700 (hereafter 850) boys; another for 350 girls; and a preparatory school for 120 boys—all within a convenient distance from the City. Also, a day, or science, school in the City for 600 boys; and a day school for 400 girls; this latter to be in Middlesex, but not more than three miles from the Royal Exchange. A subsidy of about 7,000*l.* is assigned to the day schools; and the Council are empowered to raise all requisite funds from out of the endowments by sale or other transfer of property. It may be mentioned that amongst recent lists of old "Blues" occur the names of the late Sir Henry S. Maine, jurist; the late Sir Henry Cole, C.B.; the late Dr. Edmund Parkes, hygienist; and Mr. Ewan Christian, architect. To these should be added the name of one of the earliest pupils—George Peele, the dramatist—whose father was Clerk to the Hospital 1562-1585. It is rumoured that the existing site in Newgate-street, or part thereof, may perhaps be acquired by the authorities of the contiguous St. Bartholomew's Hospital. This site (with the buildings) has been unofficially valued as worth about 600,000*l.*

ACCORDING to a Norwegian paper, the *Teknisk Ugeblad*, it appears that great satisfaction is felt among Norwegian architects at the election of Herr Paul Due, a well-known architect of Christiania as an Honorary Member of a "Society of Architects" of this country, the more so as there are, it is said, only two other foreigners upon whom this honour has been conferred. This we can well believe, but we fear that Herr Due and his Norwegian contemporaries are under a delusion as to the value and significance of the honour supposed to have been conferred upon them by English architects. The honour certainly has not proceeded from the representative Society of this country, the "Royal Institute of British Architects," which numbers about fifty distinguished foreigners as "Honorary Corresponding Members."

"DRAWING."*

IT may seem, perhaps, strange that an architect dealing with drawing should not have chosen for his title the term "architectural drawing." I have purposely avoided that title for two reasons; first, because I shall extend my remarks beyond the limits of architecture, and, secondly, because the term has a certain sinister significance. Strictly speaking, "architectural drawing" means no more than drawing of architecture; but you talk of it to a painter and he begins to think of an architect's drawing of architecture, and there rises before him a wiry mechanical piece of black and white in which values and selection and abstraction and everything that he has been taught to aim at are systematically ignored.

Now, there is no denying the fact that in nine cases out of ten the reproach is well deserved; but whether this exhausts the subject is another question, for it is quite possible that the draughtsman never intended his drawing to have any artistic value at all. The suggestion of contempt with which a drawing is dismissed as an "architectural drawing," may be founded not only on the incapacity of the draughtsman, but in some degree on a misapprehension on the part of his critic. Whether then you wish to make such a drawing yourself, or to critise it fairly when made by somebody else, the first thing to do is to form a clear conception of the specific purpose of the drawing in question.

Broadly speaking, drawings are made to answer one of three purposes. Either the drawing is a shorthand note, the place of which might be taken as well by writing; or, secondly, it has for its object to make an accurate record of natural objects, including therein the works of man; or, thirdly, the drawing is a technical method, that is, it is the technical language in which the designer expresses his own ideas and makes them intelligible to the minds of others. Stated thus, the simplest form of the third division would be a set of working drawings. I do not refer, however, to these, but to decorative design in black and white. I propose to deal with these three classes of drawings in the order in which I have given them, and I shall do so from the standpoint of the architect, leaving the difficult subject of the study-drawings of the painter to hands more competent than mine.

With "shorthand" drawings we are all of us familiar. Most of us have stood on the rungs of precarious ladders with our note-book and 2-ft. rule, and broken our shins in dingy lofts, in our all-consuming zeal to get at the very thing itself, to get on our paper, by hook or by crook, such details and sections, and measurements as will show us how the thing was actually made; how some obscure moulding really did intersect or die out in an unsuspected corner. Notes take the place of drawings, and *vice versâ*; any scribble is good enough, provided it tells its story. Architects, indeed, have almost a monopoly of this sort of work. When a painter makes an anatomical study, even of the roughest description, it cannot be a matter of indifference to him how he makes his drawing. He must consider his method, for unless he pays some attention to his shading, as well as to the correctness of his outline, he will get wrong with his planes, and his notes will have no subsequent value. But an architect, let us say, wishes to make a note of some detail. His drawing may be rough, dirty, and dilapidated, but provided it is correct and complete, the method is immaterial. The deftest touch in the world is as nothing to his purpose as compared with mere scale accuracy. To put it shortly, the object of his drawing is rather psychological than artistic, and the process, I take it, is this. He sees a piece of work which he admires; with no conscious intention of copying, he notes so much of its structure as would enable him, if necessary, to reproduce it exactly (not that this, by the way, is his object). This he does partly by drawing, partly by written notes, whichever comes readiest to hand, some instinct seeming to hit upon the one or the other at need. At least, this is how some of us make our notes. Now, the value of this work is not in the result, that is, in the various scrawls and other hieroglyphics which cover the page; neither is it in the crib of somebody else's idea, as our friends will have it when they good-naturedly suggest that such and such details are to appear in our next bit of work. The value of such work is in the mental process itself. During all this time the mind of the sketcher is, or should be, busily at work assimilating the new idea, and laying up a fresh store of material for his mind to work on, adding, in a word, to that vast reserve of facts and observations which lies behind the consciousness of every genuine artist. This being so, the method of drawing employed becomes in theory, as it certainly is in practice, a matter of complete indifference. It is of no importance whether the lines are thick or thin, adroitly sketched or ploughed in from the elbow. The essential point is the amount of thought which they imply. To make a good detail of a piece of architecture on the spot, and against time, requires considerable power of analysis, besides much previous knowledge. The Institute examination does not, I believe, include a set of working drawings made under the examiner's eye, from the top of a forty-foot ladder. Yet it would, I think, be a more effectual test of ability than learned answers, previously crammed, on the history of architecture. A truly architectural mind possesses in a high degree the quality of versatility—quickness to grasp existing conditions, and readiness to turn them to account. An architect should be, like Ulysses, πολυτροπὸς πολυμήτις "quick to turn, of many wiles," and, I believe, such a quality of mind can to some extent be acquired by this habit of trying to master the intention of any given piece of work, and transferring the results of one's thought to the paper by the simplest available means. If, then, this view of the object of an architect's sketch notes is correct, any criticism on the drawing itself becomes irrelevant. The drawing is a sort of "go as you please" process. Smudges on the paper are immaterial. These may be only the honourable scars of the rain and wind; and the point of importance is the mental condition of the sketcher himself. Any advice on this point is outside the range of my subject.

* A paper by Mr. Reginald T. Blomfield, M.A. Read before the Architectural Association on the 13th inst., as elsewhere mentioned.

Drawing, then, as far as we have considered it, is out of relation to art. It is not till we come to the second class of drawings, those intended for purposes of record, that the æsthetic question enters into the case. Everyone would admit this at once in the case of drawings of landscape,—for nobody cares about a woolly tree, or a lumpy rock, and mere labour here is as nought. The standard is higher than what is commonly accepted as sufficient for the record of architecture or work in any of the other arts, and I shall therefore limit my remarks to the latter class of subjects in dealing with record drawings. Now, bearing in mind the principle of our classification, the first point to be determined is, What is the purpose of this sort of drawing? Take, for instance, an old building. Is it our object to make an exact scientific transcript of this, or to record the impression it actually makes on us personally? If the first, the scientific methods must be followed. We must proceed by plan, elevation, and section. In other words, make a set of working drawings of the building in its existing state. This, though, of course, invaluable for its own purpose, is an affair for the mechanical draughtsman and the archæologist, not for the artist. Moreover, it always seems to me that the scietific method, like many other scientific methods, is singularly unscientific. It proceeds by eliminating half the elements of the problem, and then is undoubtedly able to furnish you with a very clear statement of the remainder. Thus, the scientific draughtsman makes his drawing to scale. He even shows every stone in its existing position, but he gives no suggestion of the weather stains on the stones, and no indication of the effect in perspective. That is to say, he leaves out of account texture and grouping, the two most important points in the whole matter.

The record drawing which I have in view is of a different order. With the impression which a building makes on the mind, exact knowledge of its dimensions has very little to do. The grouping of its different parts, the texture of the wall surfaces, the shadows which actually fall on the building, the lights and the reflected lights, these and many another detail which escapes the scientific draughtsman, are the elements which go to build up our idea of the building as it actually is, and if the record fails to give these, it fails to my mind in its primary purpose. Now the scientific record gives no reasonable suggestion of all this detail. Moreover, it deliberately ignores the element of individuality. What charms one in Hollar is not so much, or not only, the actual buildings which he drew, but Hollar's own delightful way of looking at things, and the reflex of this in his method of presentation, but it is just this very personal element that the scientific method purposely obliterates. If, therefore, we wish to hand down to posterity some record of a building as it affected you and me, and any one now living, we must seek some other method, some method which will take account of storm and sunshine and the slow influence of time. This method must be drawing of a very high artistic excellence. Whoever takes it in hand must, as a matter of course, have the power of drawing accurately whatever he sees, and correct perspective will have become to him almost a matter of instinct; but to this must be added the rarer gifts of selection and self-restraint. There are different ways of understanding accuracy. One notion of it is to draw in every detail with undeviating monotony, because they are all on the building itself. Yet the result may be simply inaccurate. A laborious drawing which draws in every moulding, and attacks each scrap of carving with obstinate conscientiousness, will give an impression of the building which, if not absolutely false, will be far less true than a sketch by a sympathetic hand, which hides half the detail in shadow, or leaves it out as bathed in a flood of sunshine. You may recollect Heine's* description of the view from the Brocken. "It is," he says, "like a map, dryly drawn, and purely coloured, but without a single beauty for the eye to rest on," and this, he continues, "is just what happens to us German compilers, owing to the conscientious exactitude with which we try to tell every scrap of the story, without the power of bringing out details with a special and peculiar charm." It is just this power "à faire resortir le détail avec un charme particulier" which is so fatally absent from most of our architectural drawings. Even in detail sketches, such as simple studies of carving, it is wise to use this subordination, to put your labour and delicate finish into one particular part of the drawing, and to leave the rest in suggestion. The eye and the mind can only take in a certain amount at once, and it is no good trying to choke people. Any one familiar with the drawings of the great masters, Rembrandt in particular, will know that to do this well is no trick, but consummate art. It implies that you are master of your material, instead of being overpowered by it. In the case of drawings of buildings or groups of buildings this accuracy as a whole, in the spirit, not in the letter, becomes of the first importance. You must first get to the idea of the building,—that is, try to make out what the designer was actually driving at; and then you must form some conception of the effect you are to aim at yourself, and determine, for instance, whether you will dwell on the detail, or on the outline against the sky. And then, to interpret all this into black and white, you must keep a firm hold on your values,—that is, you must never lose your grasp of the subject as a whole, and you must resolutely sacrifice all that is unimportant, in order to bring out the essential features. I have known good men smoke a pipe before a building for half an hour or more, before drawing a line, and I recommend this practice to those who think they can rush at a building, and hurl it on to their paper. Nothing is gained by trying to take your subject by storm; you probably end by falsifying the proportions of the building, or suffer the ignominious defeat of not getting all you intended on to the paper.

As to the style of drawing, so much good work is done in utterly different ways, that it is almost impossible to point to any one method as the only right one. The instances I have got together by some of the ablest living draughtsmen of architecture will bear this out. For details such as carving, it would be hard to surpass the delicate pencil work of Mr. Ruskin and some of his followers. The sort of tentative touch which feels about, as it were, for the form, and in good hands seems to build it up as it goes, gives a nearly perfect suggestion of texture and modelling. But, when applied to groups of buildings, this method is apt to fail; perhaps it is betrayed by its own fondness for detail. The artist must go at his work in a larger spirit, he must have a feeling for great spaces of light and shade, and still more for those highest qualities of architecture, mass and outline; and this will mean that he must deliberately sacrifice much of the detail. Mr. Fulleylove has made some beautiful drawings in this larger manner, which illustrate my meaning better than any words. One quality in common is shared by all good architectural drawings, and that is the complete absence of trick and affectation. If the lines are few, they are true and to the point; if there is shading, it is there for some well-ordered purpose, and not scattered about at random, without thought of the effect as a whole.

Perhaps one of the commonest temptations to an immature draughtsman is to "crisp up," as the odious phrase is, a dull, heavy sketch by spots of dark shading judiciously peppered over the drawing. The artifice is too transparent to be of the smallest value; it simply directs attention to the faults of the drawing, like a fine jewel on an ugly neck. A good way to avoid this trick is to begin by using only one pencil, say an H.B. There are dangerous seductions in a B., or a 6.B. Another useful rule is to avoid cross-hatching. It is best to begin, at any rate, with open line drawing,—that is, by shading with lines deliberately drawn side by side. The very finest drawings in the world have been made with open lines, and, apart from this, the practice has this advantage, that you can never deceive yourself about your own drawing. After a certain amount of practice, you may acquire that lightness and freedom of touch and that sure rapidity of execution which are, I think, the finest qualities of pencil drawing. The essential thing is to avoid trick; or, if you must have tricks, at least to form them for yourself, and not borrow other people's.

Pencil drawing, in regard to the modern methods of illustration, is of less importance than pen-and-ink work, owing to the facility with which the latter is reproduced. It might be expected that architects would excel in pen-and-ink work; they have considerable practice in it,—yet to judge by the works of the architectural draughtsman, there is no form of artistic drawing in which they more conspicuously fail. Of course, there are some eminent exceptions to this, but I take the average. We are all familiar with the architectural draughtsman and his ways. He takes a house by John Doe, and a church by Richard Roe, and with his unfailing recipes he turns them out as spick and span as if they grew from the self-same brain. Indeed, I believe there is a machine for the manufacture of perspectives, and if there is not, it would only be the natural development of this ungodly drawing. A line drawn one way represents stones; turned another, it does for bricks; ruled straight, it represents slates; ruled with a crick, it is taken for tiles; a sprinkling of scriggles does for trees; and marvellous convolutions of lines, neatly broken off at a fixed point, are understood to be clouds. The figures come from old fashion sheets, and the dogs and horses from the Noah's ark of the draughtsman's childhood. The whole thing is a trick from end to end. It reminds one of the instructions given by the British workman to his apprentice on the methods of graining. "Meoggany," I says, "and you combs it so, and puts twiddles with a rag. Then I changes my mind, and I says oak, and you up and combs it lighter, and puts the twiddles t'other way. Then I says wornut, I says, and you makes it werry dark, and turns the twiddles upsey down. Then I up an' I says 'marble,' I says; then you paints it black, and shies a begg at it, and there's your marble."

No wonder that if this is understood to be architectural drawing, the very name of it is a byword of contempt. Not only are the trees not like trees, and the figures wooden, and the animals ridiculous, but the architecture is not like architecture. This uniform monotony of straight-ruled lines, varied by certain tricks of the trade, quite fails to give any notion of the building, not only to the layman, but to us, the learned in the 45° and T-square. The standard of drawing among architects has certainly risen in the last few years, but the architectural draughtsman still flourishes in our midst, as any one can tell from the abundance of his works, and the numerous publications of measured drawings and sketches by men who seem to be unfamiliar with the rudiments of black and white. In regard to the latter, I believe it is a mistake, as a mere matter of advertisement, to publish drawings unless they have some artistic excellence. The public does not look at these things, and architects take them at their proper value. If, as architects, we are to be worthy of our claim to be artists, it is high time that this sort of work should be discredited, even if it is necessary to throw overboard the cherished delusion that it is in the power of any one, with the help of a few trade tricks, to turn out a satisfactory architectural drawing. In point of fact, it is not given to everyone to be a fine draughtsman; it is not given to one architect in fifty; and the sooner we recognise our limits in this direction the better for our reputation. After all, a man can be a great architect without being a great draughtsman, and though, as I believe myself, noble ideas sometimes get marred by the designer's inability to get them out on to paper, the amount of drawing power which is necessary for this purpose is quite a different thing from what constitutes fine draughtsmanship, and that this is so is proved by the beautiful works of architects who are not pre-eminently distinguished for their skill in drawing. It is not necessary to pitch one's T-square into the fire, because one feels unequal to good pen-and-ink work. Perhaps it would be wiser to leave it alone, or if it is absolutely necessary to assert your existence at the annual Academy show, to go to someone who understands the business.

The remarks I have offered above in reference to pencil work, apply in the main to pen-and-ink drawing; but there are one or two limitations in the latter which require attention. It is best to get over the ordinary difficulties of drawing correctly, before taking to the pen; for the latter is by no means so kindly as the pencil; and it is a very different thing to rub out a pencil line and to scratch out a detail in Indian ink. So far as regards abstraction and selection, much the same principles must be followed as in etching. Pen work is the directest form of black and white, and as much depends on the white as on the black; in other words, a skilful artist tells you as much by what he leaves out as by what he puts in. Mr. Pennell is extraordinarily dexterous in his power of omission; he is only surpassed, perhaps, by Viergo the Spaniard and some of the Frenchmen. As compared, however, with etching, the pen moves much less freely over the surface than the needle, and a

* "Reisebilder."

person with a clumsy touch constantly finds his pen digging holes in the paper. To avoid this, you should cultivate a light, free handling of the pen,—what the French would call, "légèreté"; and, as a general rule, it is wise to avoid cross-hatching, partly because you scratch up the paper, partly because you sacrifice too much of the white. Mr. Railton, however, sometimes cross-hatches with admirable effect.

Another limitation of the pen as against the needle, is that the pen-stroke must be made once for all; to repeat it is to destroy its value, and you cannot bite it deeper. It follows, therefore, that you must think rapidly, and realise your effect with unhesitating decision, if you are to attain to the highest qualities of pen-and-ink drawing. Turnbull's Bristol boards, and any flexible pointed pen, not crow-quills, are all the tools necessary,—that is to say, if you work for reproduction,—for in this case the drawing should be in the blackest of ink on the whitest of paper.* If your drawing is not made with this intention, a smooth, tinted paper is much pleasanter to work upon. There is an excellent paper, not unlike parchment, sold for this purpose in Paris.

It is impossible within the limits of my paper to deal with modern work, but I should like to call the attention of the younger members of this Association to Cotman's architectural etchings. Taken as etchings, I think they fail in the freedom and suggestiveness of first-rate etching; Cotman always tended to make his etching an engraving on copper. But as studies in black and white, for solid draughtsmanship, for composition in light and shade, and for suggestion of texture, these etchings are unsurpassed; and for draughtsmen who feel that the marvellous tact and subtlety of a Vierge is entirely beyond them, Cotman forms a valuable model. The only danger is that his rather artificial method is apt to degenerate into trick in inferior hands; and, indeed, I believe that the architectural draughtsman, *pur sang*, might father some of his methods on Cotman. If, however, instead of copying his faults, you make for the great qualities at which Cotman aimed, you will, at any rate, steer clear of the flimsy and ineffectual draughtsmanship which appears to satisfy most of us.

For insight into the spiritual qualities of architecture, Piranesi and Meryon stand absolutely alone. Not only were they both consummate masters of the line, but to this they added a far-reaching imagination which gave to their drawings of architecture much more than a merely technical interest. These two men have placed the poetry of pure architecture beyond the reach of challenge, and the one is the correlative of the other.

Piranesi found in Classical buildings material for a sombre fancy that had its pleasure in great masses of masonry, and endless vistas of colossal architecture; and for once in a way an artist of first-rate power selected as the vehicle of his ideas architecture in its most abstract form—architecture unclothed by sculpture, and dependent only on its own great strength. I refer to the large Prison series. It might well make us despair to turn from the midst of our little work, with all its prettiness and fussiness, to the terrific immensity of Piranesi's vaults, and the vast mysterious horror of these Titanic halls. Grandeur was the quality on which his genius was set. He showed the walls of the Roman buildings like the cliffs of the seashore. Piranesi must have revelled in the mightiness of the Roman work, his ear caught across the ages the echo of the workshops of the great imperial builders; and so long as modern civilisation lasts, there will be minds in sympathy with his and eager to honour him for his revelation of the spirit of a mighty past. And Meryon for his part had thought himself into the spirit of Mediævalism. His was a strange wild nature, out of touch with his time, but in singular harmony with the supernaturalism of the Middle Ages. To Meryon's grim fancy the air was no mere oxygen and hydrogen, but the home of myriad spirits, and for him the powers of darkness would haunt again the lonely pinnacles of the great Cathedrals. The "Stryge" expresses to my mind the very quintessence of one side of Gothic art; and you may find Meryon's innate Gothicism again in his intense perception of detail.

Meryon and Piranesi have given us the highest level yet reached in the interpretation of architecture, and between them they cover the whole range of its expression in black and white. It is a curious coincidence that in both cases their rare genius ended in madness.

We have hitherto been considering record drawing in relation to objects already in existence; but the question arises, How are we to deal with drawings of objects, buildings, let us say, which exist only upon paper or in the designer's mind? The problem is certainly difficult, and we are not helped towards its solution by the practice of the day. The architectural draughtsman solves it by the recipes of his office, and his method I believe to be utterly unsatisfactory. On the other hand, some of the most successful draughtsmen of the day anticipate the effect of some 200 or 300 years on their buildings. They reproduce in their drawings effects which they have already annexed and made much of in sketches of actual buildings. This, though an attractive method, seems to me to fail in honesty of purpose. We must, as usual, look to the practice of the great men of the past for the answer. I do not recollect myself in any of the architectural sketches of the great Renaissance architects any such merely pretty sketches, on the one hand, or such elaborate masterpieces of monotony on the other. Inigo Jones, our great master in architecture, used to make free-hand sketches of his work, roughly hatched, or in more detailed drawings he would rule in a few of the more important lines, and sketch in the rest, and tint in monotone. He made little or no attempt to give the effect of an old building to a new one. With characteristic contempt for futility, he appears to have thought it a waste of power to devote any more trouble to a drawing than was necessary to bring out the purely architectural qualities of a building; and his simple, slashing method was exactly suited to the purpose. The system of painfully working up each detail came in with the Epigoni, with the inferior men of the eighteenth century, who hoped to hide the poverty of their endowment under a mass of laborious finish. This is very much what has happened among ourselves. As I said before, it is not given to everyone to make good drawings or to design good architecture; yet the whole practice of modern architecture is conducted as if it was. Bad draughtsmanship is concealed under the labour of these many lines, and bad design lurks behind the crispness of many an effective sketch. We ought to be more honest in our drawings of our buildings,—we ought to be content with a strong, straightforward draughtsmanship, sufficient to show the grouping and meaning of our building. Anything beyond this is, I think, a trick or a worthless *tour de force*.

The third division of my suggested classification is drawing as a technical method; that is, drawing of which the primary purpose is to express, in line, an idea in the designer's mind. At first sight this seems to approach the first division, in which the drawing is entirely subordinate to the mental process; but it differs from it, in that in this third division it is impossible to separate the idea from its expression,—the two work themselves out together in the mind of the designer, and thus it is separated from mere shorthand work by the importance which it is to claim for its method. And again, it is separated from record work by the fact that it deals, not with the transcript of an idea either already realised or having a value independent of the drawing, but with an idea in the designer's mind, the object of which is attained by its expression in the black and white design. That is to say, it does not depend for its *raison d'être* on its realisation in some ulterior material, whether past or future; but when the idea is once expressed in the design, let us say on paper, the idea and its expression together form a complete and independent work of art. Realism, therefore, is not so much the object as the most forcible expression of this idea; and everything which interferes with that expression,—such as excessive imitation of texture,—is superfluous and wrong. This, to put it shortly, seems the intention and justification of the very conventional use of black and white, which is most perfectly exhibited in the works of Albert Dürer or Lucas van Leyden, and the little masters. You take a woodcut by Dürer. There is no suggestion of merely imitative realism, and yet every line tells its story; each line suggests the field of thought in which the mind of the artist has been at work. The lines seem to be dashed into their place without effort, yet each is burdened with thought,—it is there as a factor in one organic whole. The twenty-ninth plate of the Little Passion represents Christ rising from the tomb. In the left-hand corner is the sun just showing above the fields. The rays are given by single lines radiating from the sun. Nothing could be more simple, almost rudimentary, than the means employed; and yet it is impossible to conceive of any method which could suggest more vividly the strange supernatural light, neither night nor day, in which Dürer has represented this intensely mystical act. It would be clearly absurd to criticise such a drawing on the score of its disregard of realism, for no such thing was ever attempted, and I do not see myself the slightest necessity for attempting it in work of this sort. There is the primary objection that to do so distracts the mind from the main idea. Moreover, any representation of an object in nature, short of actual facsimile copy modelled in the solid and coloured, only resembles that object by convention, and through the force of association and knowledge. There is, therefore, nothing illogical in making a further demand on this convention, and confining your imitation to what is strictly necessary to suggest the idea of the object in question, with this limitation, however, that the greater the artist's ability, the profounder will be his insight into the character of any object, and he will therefore suggest its essential qualities instead of mere accidents.

All kinds of decorative work in black and white, and the line, book decoration, the designing of advertisements, broadsheets, circulars, and the like, form the proper field for this sort of drawing. I don't know who is responsible for the advertisements and postbills which make our boardings hideous, but there always seems to me here a grand field for a good designer in black and white. Mr. Herkomer, following in the footsteps of Fred. Walker, set an example a few years ago with a well-known advertisement, but his example has not been followed, except in some rare cases where men of first-rate ability have been employed. Then, again, book-plates, title-pages, headings, and tail-pieces, all give fine opportunity for the skilful use of the line. The beautiful work of Mr. Crane, Mr. Heywood Sumner, Mr. Whall, and others, is familiar; and I will only add one other instance of an admirable design in black and white, a book-plate for this Association, drawn and designed by Mr. Lethaby. In regard to the method to be used, I have anticipated elsewhere the few remarks I have to offer, and shall only summarise what I believe to be the most important points.

1. The lines should be firmly drawn, and kept distinct, they should be of uniform thickness, and each line should be thought out.

2. If the drawing is to be accompanied by printed type, the scale set by the latter should be followed in the drawing, and the type used as in itself a means of decoration. Where it is possible, the type should be designed with the drawing.

3. Mere realism should be avoided; and the decorative standpoint sedulously adhered to.

I must ask your indulgence, if I take up your time in answering a criticism on the remarks referred to above. In a leader in the *Builder* of Oct. 12, 1889, it is said: "Turner was far too great a poet in landscape painting to be harassed by any such shackles," to wit, the shackles of decorative art. No one ever denied that Turner was a poet in landscape painting of the very first order; but landscape paintings are not executed on printed pages, and when these latter have to be illustrated certain limitations of method and material are introduced, which no artist with any idea of design could afford to overlook; and it was just these limitations that Turner, being essentially a painter, disdained to consider. Anyhow, against Turner's practice there is to be set the entire consensus of all the great masters of design in black and white of the fifteenth and sixteenth centuries. Again, when pointing to Dürer as a model for imitation, the work I had in view was only this decorative design. To apply it to drawings of buildings, or to any form of what I call record work, is as the *Builder* says, a mere archæological affectation,—in short, a trick.

To come, then, to some conclusion in the matter. The point which I have endeavoured to lay before you is, that before making, and certainly before criticising, a drawing, a clear conception must be formed of the purpose of the drawing. A drawing may be made as part of an educational exercise, or as a simple short-

* Not necessarily black ink; a warm brown ink reproduces just as well; many draughtsmen are not aware of this. Of course, unless it is to be printed in the same colour, the draughtsman does not realise so well what will be the effect of the reproduction.—ED.

hand note. Here the drawing is out of relation to art, and should be criticised from a totally different standpoint.

Again, the drawing may be made to record some building or work of man, in its actual state and surroundings; and here I contend that the methods of the typical architectural draughtsman are inadequate and absurd, and should be permanently discredited. Drawings of this class require consummate draughtsmanship and knowledge, and are not a matter of hard sketching to be knocked off by any one. The standard of architectural drawing in this respect should be higher than it is. I am sorry if my remarks are disagreeable, but, to borrow a sentiment from your President's address, I take architectural drawings as I find them, and I find some of them exceedingly bad.

Thirdly, drawing may be used to present, in black and white, some conception of the mind; and with this a simple method should be adopted, which sacrifices all that distracts from the main idea, and treats each line as a matter of decorative design. To apply to one class the standard and principles of another inevitably means confusion and false criticism.

It may very well occur to many of you that, after all, an architect is not primarily a draughtsman or a designer in black and white. No more he is; but this field of design is just one of those on the border-land between the province of the architect and the painter, which are rapidly slipping out of our control into the hands of specialists, so that day by day the work of the architect is being narrowed down to the strict limits of the planning and construction of buildings. Many a client to this day considers that in matter of taste he is the superior of his architect, and at this rate the architect will be relegated to the position usually assigned him by public bodies, of a superior clerk of the works.

In the great days of architecture an architect was primarily an artist. He was supposed to do work not only for the sake of immediate profit, or even honour, but for its own sake. He might have taken as his motto "*Ne te quæsiveris extra.*" Nowadays, through indolence and timidity in yielding to the aggressive assertion of the business man, we have almost lost our claim to be considered as artists at all. You know what Lord Grimthorpe, that Goliath of the Philistines, calls us. He says that an architect is no more an artist than his cook; and Lord Grimthorpe is a fair index of uncultivated public opinion. Many of us must have winced under the phrase "architects and artists." It is time we combined against such an insult to our calling, and to combine means a determined individual effort along common lines. It means systematic resistance to what is vulgar and commonplace; and for each of us persistent self-cultivation, and an unswerving search for the most beautiful modes of expression in drawing and design. We are not very likely to develop the genius of a Méryon or Piranesi, but something at least may be done by the labour of love, and a sincere enthusiasm for beauty in art, which is not to be fobbed off with any tricks of the trade or traditional platitudes.

[For a report of the discussion, see page 443.]

ROYAL INSTITUTE OF BRITISH ARCHITECTS:

THE ARCHITECTURE OF PROVENCE.

THE fourth ordinary general meeting of this Institute for the present session was held on Monday evening, at No. 9, Conduit-street, Regent-street, S.W. Mr. J. Macvicar Anderson, Vice-President, in the chair.

On the motion for the confirmation of the minutes,

Mr. Robins asked in what order the names of gentlemen who had passed in the recent preliminary examination were placed, whether in order of merit or in alphabetical order?

The Secretary (Mr. Wm. H. White) replied that in the preliminary examinations the names were returned in the order of the date of the candidates' applications; that was to say, the forty-four first names were the names of those who were exempted, and they went in the order of the date of their application. The remainder were those who were examined in London and in the various centres, and they were placed in the order of their application.

Mr. David MacGibbon then read a paper on "The Architecture of Provence," of which the following is an abstract:—

In a few introductory remarks, the author stated that architecture might be said to have been introduced into Provence by the Phœnicians, who colonised the country about 1000 B.C., and traces of whose work were still discernible in the harbours they had established, and the forms of worship they had observed. He then briefly referred to the Roman remains in Provence, pointing out that these were of foreign origin, and that his remarks would be limited to the native style of the country. Provençal architecture, he considered, had sprung up with the revival of the arts and letters about the time of Charlemagne, before which period the architecture of Rome everywhere prevailed. The mode in which Roman construction was continued in the West as late as the ninth century was well illustrated by the church or mausoleum erected by Charlemagne at Achen; and where Roman examples existed it was natural that the works of the Teutonic invaders should have been adaptations of them. In the native architecture of Provence would be seen all the Roman elements preserved and still in daily use until the eleventh century; and their gradual change in the twelfth century into a special form of Romanesque, in which the stages of the transition were clearly discernible, could be noted. Mr. MacGibbon then proceeded to describe twenty-four examples, of which illustrations were exhibited by the lime-light. (1) The Church of Saint-Paul-trois-Châteaux, the elevation of which might well be taken for a structure of the late Empire, but was supposed to be of the tenth or eleventh century. (2) The porch of Notre-Dame-des-Doms was so strikingly ancient in character as to have long been regarded as a Classic structure, but was probably a work of the tenth or eleventh centuries. (3) The Sainte-Trinité (one of the early chapels on the island of Saint-Honorat-de-Lérins) was clearly an imitation on a small scale of Roman domical and vaulted construction. (4) The Baptistery at Fréjus, on the Riviera, was a sample of other similar structures long regarded as Roman works. (5) The celebrated monastery of Montmajour contained several buildings of great interest in connexion with the development of Provençal architecture, of which the Chapel of Sainte-Croix was remarkable, and was the late example of an imitation of a Roman form of construction. (6) The Chapel of Saint-Pierre, at the foot of the rock on which the Monastery stood, was an example of early deviation from the traditional type of classic columns and capitals. (7 and 8) Saint-Trophime, Arles, exhibited two very fine examples of the fully-developed Provençal Romanesque in the western portal and the cloisters. (9) The cloisters at Elne. (10) The portal of the church of Saint-Giles, which was the most complete and most finished illustration of that Provençal style in which the Visigothic spirit prevailed almost completely over the Classic, was described by Mr. MacGibbon in considerable detail. He then dealt with the vaulting in Provence, directing attention to the different forms adopted, and to the peculiarity that they were pointed and not round arched. The domes were next alluded to, and the effects of their employment on the structures subsequently erected in the whole of the South of France described and commented upon, especially in cases of church plans. (11) The Cathedral of Fréjus had originally been an instance of the single nave or hall plan, aisles being added afterwards. The examples he had described gave an idea of the various steps by which the Romanesque style advanced in the country up to the middle of the twelfth century, and showed that a style was produced which at first borrowed its forms from Roman models, that they had been gradually modified by the Northern spirit, and continued to the last to rejoice in exuberance of decoration. Mention was then made of the rise of the Cistercians and the style introduced by them. (12) The Monastery of Thoronet was described as an example of the plain and severe style of the Cistercians. (13) The cloisters of Thoronet; and (14) The nave of Saint-Trophime at Arles were also cited as examples of the same style. The introduction of Northern Gothic took place in the thirteenth and fourteenth centuries, spreading over the whole country, and producing a mixture of Provençal elements of construction and Gothic ornamental details which was far from satisfactory, and of which (15) Saint-Nazaire at Béziers, and (16) Saint-Jean at Perpignan, were examples. Churches in that mixed style continued to prevail in the south of France until the fifteenth century, but the importation of Northern Gothic became more and more marked. Mr. MacGibbon then referred to a very important phase of the architecture of Provence,—the military structures. The walls of the cities of (17) Carcassonne and (18) Aigues-mortes were deservedly celebrated as the most perfect representatives of the art of defence of towns as practised in the thirteenth century; and were both described by the author, as well as the walls of Avignon and (19) the Abbey of Cruas. (20) Villeneuve-lez-Avignon, the great castle of Saint-André, on the west side of the Rhone, presented many interesting features, and was also described. Attention was then directed to the Watch- or Keep-towers of Southern towns, the construction of them being explained by the speaker, and the Keep of (21) the town of Saint-Paul-du-Var, especially referred to as of peculiar construction. Having briefly reviewed the course of Provençal architecture he had described, Mr. MacGibbon referred to (22) the castellated monastery of Saint-Honorat as a very interesting structure, in which were combined examples of all the styles of Provence, and, having given a general idea of the building, described (23) the lower cloister, and (24) the upper, of Saint-Honorat, in considerable detail; the latter and other examples showed the Italian influence which prevailed over a large portion of the Riviera. The speaker concluded by stating that on the island of Saint-Honorat there was ample evidence of its varied fortunes and of the different people by whom it had been possessed. On that island there was thus preserved an epitome of the varied architecture of Provence.

The Chairman said that no doubt many of them came there attracted by the subject, and expecting to be interested. He felt sure he did no more than express the opinions of all present that not only had they been interested, but instructed by Mr. MacGibbon's exhaustive treatment of the "Architecture of Provence," so capitally illustrated by his admirable sketches, thrown on the screen by the lantern. It had certainly been extremely interesting to trace with him the Roman characteristics of the earlier buildings to which he had referred growing into the Romanesque period, to be themselves superseded in turn by the Gothic features from the North. One thing that struck him forcibly was the massive and grand simplicity of many of the buildings. In these days of luxury and ostentation, he thought most architects might not be above taking a lesson from this feature. It was comparatively easy to cover a façade with ornamental detail, but too seldom was it that an architect had the courage to leave a mass of simple wall space.

Mr. Phené Spiers, in proposing a vote of thanks to Mr. MacGibbon, said he was extremely interested to find that he had attempted to trace the origin of many features of the earlier forms of Romanesque work found in the vicinity. He quite agreed with the statement that the style, as they found it, must be looked upon as one which took its form almost entirely from the old Roman work, and that it was very little influenced by the Byzantine work. In these earlier periods the great pride of the mason was to try and imitate something which had gone before. He remembered reading a letter from some monk to Charlemagne, in which he boasted of the monastery he had been able to erect "after the antique fashion." It was curious to notice how the mason of that period fancied he was clearly copying the old work when he was producing the work in question. In many of these buildings in Provence they found the same thing. The architect of the Church of St. Gilles certainly thought he was doing his best to copy the style he had seen built by the Romans. It seemed to him that the mason of that period attempted to copy the peristyle of the Maison Carrée at Nimes, in which they found three distinct features,—the architrave, the frieze, and the cornice. The architrave was looked upon as a decorative feature; the frieze was greatly increased because they wanted to introduce figures of greater importance, and the cornice was still there. But they seemed to conceive direct imitation, and the masons evidently thought when they were making that building that they were erecting something which was equal in its character and style to the peristyle of the Roman temple. He had

been thinking whether, instead of Venetian influence having come over to France, it was not possible that Provençal influence had extended to St. Mark's at Venice; whether the assemblage of columns there piled one upon another in a manner totally unknown in Byzantine styles might not have been taken from many important buildings in the South of France. He certainly thought that St. Front, at Périgueux, was a copy of St. Mark's at Venice. They did their best to copy that church, but when they came to construction they did not know how to form the pendentives. The pendentives at Venice were portions of spheres, but at St. Front, at Périgueux, in consequence of the arches being pointed, they were simply what we should call webs. Probably the pointed arch at St. Front, at Périgueux, was one of the earliest examples; and they might look upon the system of construction as being the precursor of the introduction of the Gothic vault. He was sorry to say that a great deal of St. Front, at Périgueux, had been pulled down to be built up again; and, so far as he could see, the shape of the arch was so nearly circular as to be an entire change from the original form. He confessed to a feeling of disappointment in the fact that the views they had seen that evening had not been photographs from nature. He had been informed that Mr. MacGibbon took some photographs, and he was in hopes that they would have seen them. They were startled a fortnight ago by the photographs exhibited by Mr. Elsey Smith, and though he was disappointed at not seeing some that evening, he was bound to say that Mr. MacGibbon's pen and ink sketches quite stood the ordeal. The accuracy of their perspective was shown to be very exact by the way in which they appeared on the screen. He had much pleasure in proposing a vote of thanks to Mr. MacGibbon.

Mr. Wm. White said he should be most happy to second the vote of thanks to Mr. MacGibbon, which he was sure was well deserved. From a general historical and descriptive view of the architecture of a considerable district, he had shown the manner in which so much of the work had been developed, giving them the channels by which it had come. There was no doubt that not only local architecture was copied by those who had colonised or taken possession of a district, but also they took back a great deal to their own country on their revisiting it. The manner in which that part of the country was colonised, and the architecture distributed, seemed to have been very much the same as that in Cyprus, which they were told of a fortnight ago. First came the Phœnicians, then the Greeks, then the Romans, and then the other succeeding elements which certainly affected the whole of the architecture of the district. The pictures of Avignon were very striking,—the Bishop's palace, and also the towers and fortifications. They were almost the only instances that he had seen of the work which had been described by Mr. MacGibbon, and while feeling much interested in them, he felt he ought to apologise for saying so much as he had done.

Mr. Loftus Brock said that he was recently reading that a competent hand might make a good deal of this subject, but that no competent hand had yet touched it. It was a matter of congratulation to them to know that such a hand as Mr. MacGibbon's should have taken it up. Certainly, the drawings that had been exhibited showed different phases of Gothic work to anything that they were accustomed to. When they examined it, there was one feature which had never yet received the attention it deserved, and that was the curious fact that whenever any Gothic work was erected under a permanently sunny sky, instead of it being tall and aspiring, as Strasbourg Cathedral under a northern sky, on the contrary it became flat and heavy, and not aspiring. Whatever might be the case as to details, the general style was as stated, one of the most interesting features of the lecture was the comparison which was drawn between the classic work of Provence, and its adaptation and development in later times. He thought they could glean a good deal of information of what the style had been in Roman times by what had been put before them that evening. With regard to the columns that had been referred to, unless they were examined accurately on the spot, no one could be aware of the extreme delicacy and beauty of their carving. From what he had seen of casts of this work in Paris, he was led to the belief that the work was the same as was found in the columns of the crypt of Canterbury Cathedral, which were too little known, but which were probably executed by foreign workmen. It was a curious point brought out by the lecturer, but it might be a matter of interest to refer to what had been said of the cessation of the classic style of carving which these buildings gave them. He ventured to think that Mr. MacGibbon would find that the great bulk of the carving such as they saw in those beautiful portals of St. Trophime, at Arles, were almost exactly like the carvings of Roman times, which survived, as two things could be, but if they put the classical carvings at the Museum side by side with those of the twelfth and thirteenth centuries, they would find a very great contrast. But the more they went up the stream of Time the more, he took it, they would find that the old Romanesque work of Provence showed the same style and mode of construction. Compare this little building and the baths of Diana at Nimes. The two works were identical, and yet there were 800 years between them. There was a marked resemblance between those buildings and the triumphal arch of Susa,—they were almost line for line. Now these were all things which they were not accustomed to, and he took it that their thanks were greatly due to Mr. MacGibbon for having brought this before them, and when his paper was printed they would be able to study the subject more at leisure than they were able to do that night.

Mr. E. J. Tarver said he thought they owed a debt of gratitude to Mr. MacGibbon for bringing forward these early Romanesque buildings,—buildings which had been called by Fergusson "Christianised Roman architecture."

Mr. Campbell Douglas said that Mr. Spiers had expressed regret that the lecture was not illustrated by photographs rather than by sketches. He would join issue with that opinion. Photographs were all very well, and they were enormously indebted to them; but he thought, when they were dealing with matters of detail, he would prefer his own rude sketches to any photograph. The artist who drew the picture had, so to speak, the photographic image and the retina of his mind. The sketch might not be such an accurate representation, but that would be counterbalanced by the knowledge of detail gained by the artist. He felt very proud of his little country,—and he was there as a Glasgow man,—to find an Edinburgh architect enlightening them.

After a few remarks from Mr. Needham Wilson and Mr. Burrows,

The Chairman put the vote of thanks, which was carried by acclamation.

Mr. MacGibbon, in acknowledging the vote of thanks, said, in reference to Mr. Spiers' remarks as to St. Front at Périgueux, that what he said was not that St. Front had not had any influence, but that he did not think there was sufficient ground, in the fact of St. Front being copied from St. Mark's, to support all that the French authors wished to found upon it. Admitted that St. Front was a copy of St. Mark's, as nearly as workmen could carry it out, still he wished to draw attention to the fact that the cupola was in general use throughout Europe. Mr. Brock referred to the differences in the Northern and Southern Gothic, and he must agree with him, that it was the interest attaching to this which led him to take up the subject *con amore*, and he could assure any one who could spend two or three months in a winter holiday in Provence that he would find much to interest him. Mr. Campbell Douglass had been kind enough to defend his poor sketches, and he was very sorry they were no better. So far as a man was personally concerned, the sketch was of very great moment to him, but the more lifelike and the more true to nature the illustrations to such a lecture were, the better for those who were listening. No doubt a carefully-prepared photograph gave a fuller representation than any one could do with a sketch. One or two other points were brought forward by other speakers, but he was unable to pick up the exact point that was wanted to be explained. A good deal of information on the subject of his paper would be found in Révoil's book, entitled "L'Architecture Romain de France."

The proceedings terminated with the announcement that the next meeting would be held on Monday, January 13.

THE NEW PRUSSIAN POLICE REGULATIONS REFERRING TO THE SAFETY OF THEATRES.

THE new "Prussian Police Regulations Referring to the Safety of Theatres" were published on the 30th ult., and have been in force since the 1st inst., one year's grace being allowed for alterations in buildings already erected or in course of erection. Since 1881 these regulations have been in the hands of a "Commission," which had been called together by the Minister of Interior and Minister of Public Works, and which has consisted of several Government building officials, several architects and engineers, several directors and managers of theatres of various grades, and the chief of the Berlin Fire Brigade.

The new regulations, which are of a very detailed and exact character, are intended to give the public a feeling of security in public places of amusement; and the Government hopes that by a strict enforcement of the rules many of the existing dangers will be prevented.

Looking at the new regulations as a whole, one sees that the chief aim is to prevent the danger to life and limb caused by panics founded either on real or false alarms of fire. Very exact rules have hence been laid down as to the number of exits, and the convenience of getting at them from every seat in the building. The width of the doors, passages, stairs, &c., have to be in a certain ratio to the number of people likely to use them; and a common method of describing the routes to be taken to gain the open has been arranged.

As panics are known to be just as dangerous in absolutely fireproof buildings as in those of somewhat more combustible nature, not half so much stress has been laid on the materials themselves as is usually the case; in fact, that part of the regulations referring to the safety of the building itself has been put quite into second consideration. Wooden columns, flooring, and corridor partitions are distinctly permitted, and even wooden staircases can, as a rule, be erected, only a few exceptions being made in the preference to iron. Wooden staircases are considered to be safer than either those of stone or iron, especially if the underside of the wood have a good coating of plaster.

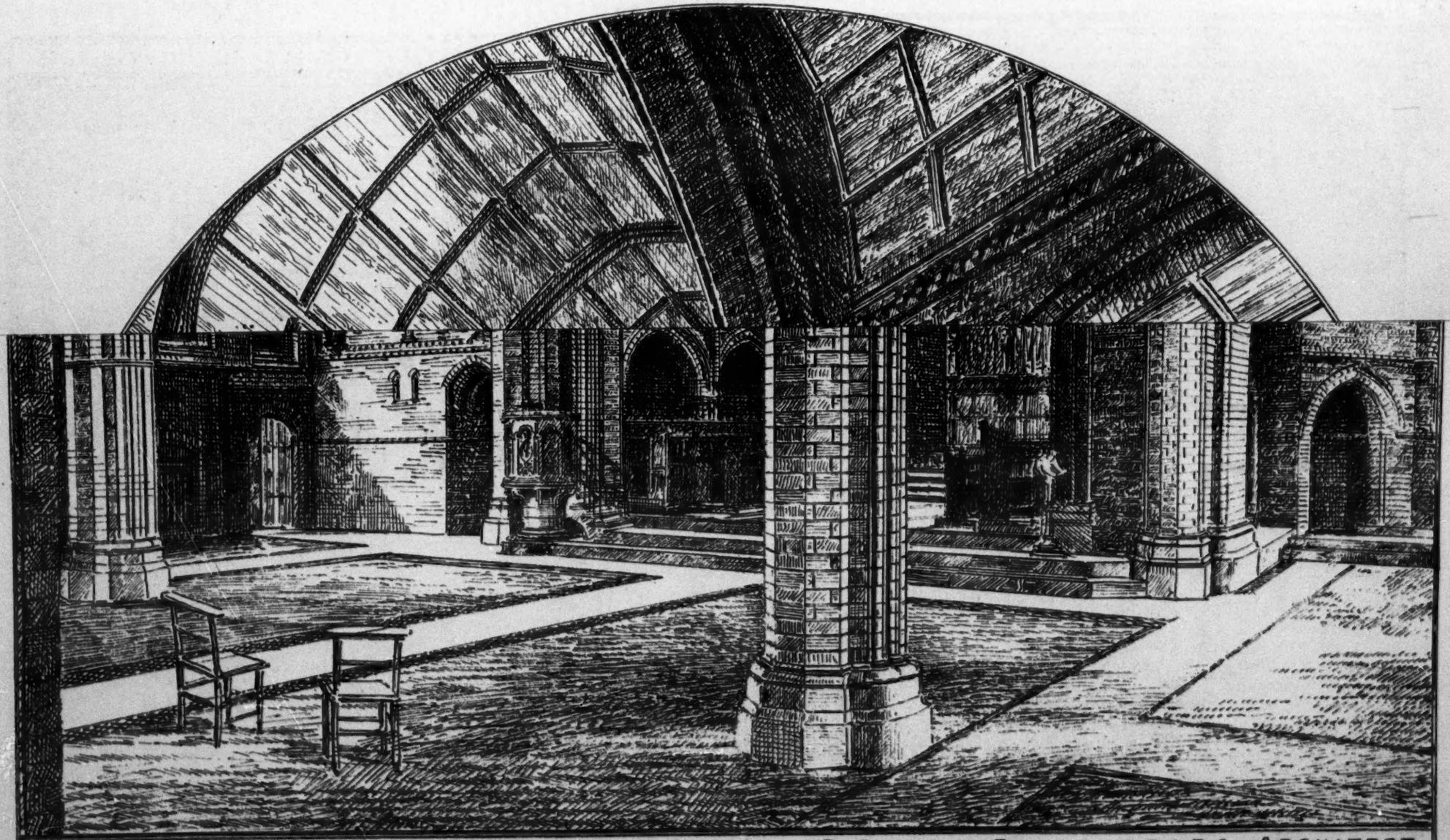
The Commission has considered it to be of great importance that smoke or suffocating gases should be stopped from entering the passages and staircases. In order to avoid this, ventilating-flues, easily manageable in case of need, have to be made both over the stage as well as in the ceiling of the auditorium, and the disposition and construction of the flues are subject to very stringent rules. It is chiefly to prevent the smoke from filling the auditorium too rapidly that the so-called fireproof curtain is to divide the theatre into two parts. Its substance is simply required to be incombustible, but its working is distinctly not to be automatic; in fact, no self-working contrivance is permitted in any position where it would be of importance if it did not work. Such doors as may be required in the wall between stage and auditorium are to be of hard wood plated on both sides with iron.

The impregnation of stage paraphernalia, so as to render it uninflammable, is not required, but the scenery itself is to be of as uninflammable a nature as possible. A substitute for canvas is not definitely mentioned in the regulations, but the official "Centralblatt der Bauverwaltung" recommends a certain cloth of wire netting and asbestos, invented by Mr. E. Tepper, of Berlin.

The Commission has set down several paragraphs concerning the lighting, ventilation, &c., but no novelties are to be found in those parts of the rules.

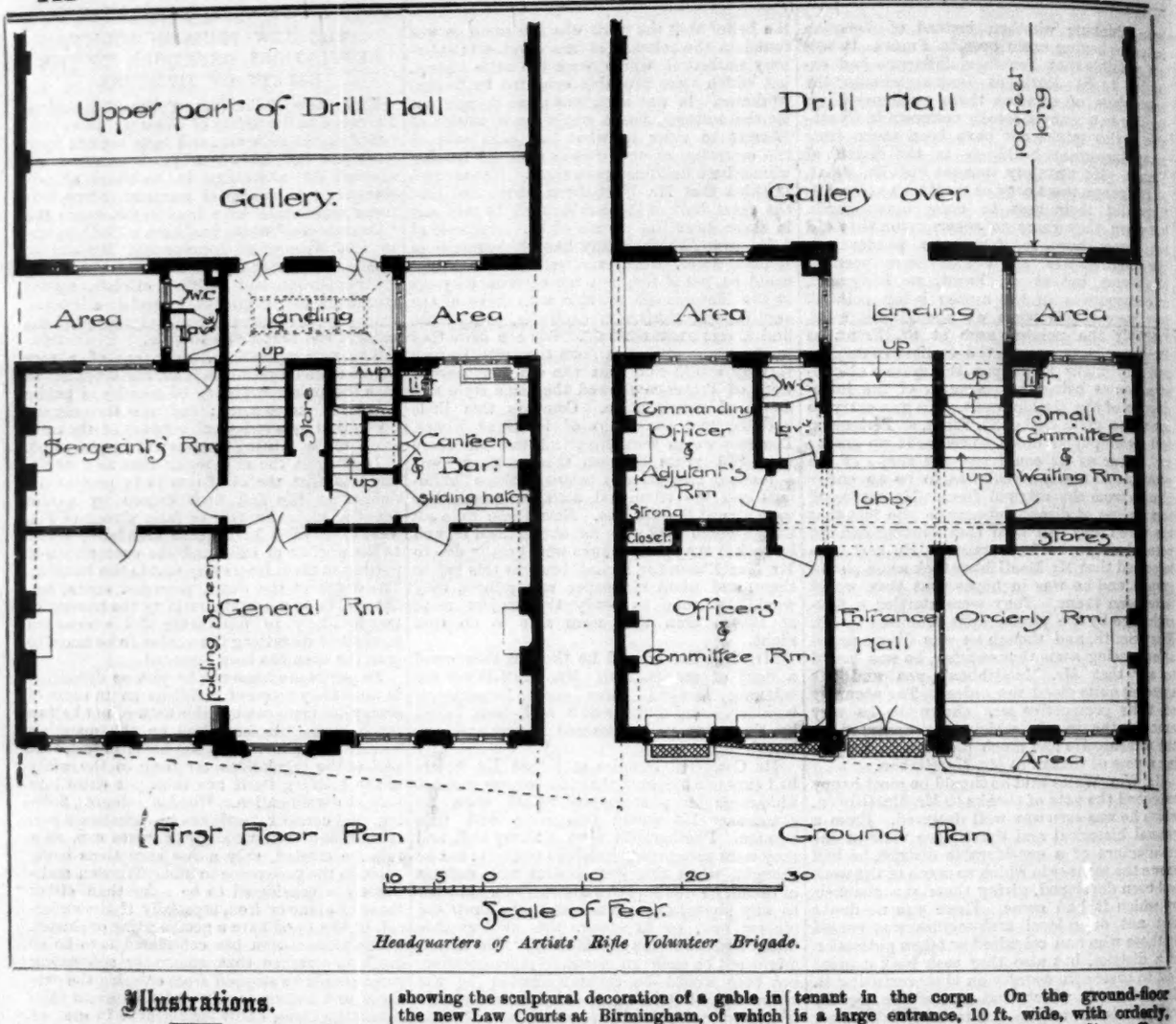
Great care has been taken to let the rules be of as practical a nature as possible, and not only of a theoretical kind. The regulations of the cities of Paris, Vienna, New York, and London seem to have been well studied, and the results of the official inquiries into the Ring Theatre and Opera Comique fires were taken fully into consideration.

Death of Mr. F. R. Conder, M.Inst.C.E.—We record with much regret the death of Mr. Francis Roubiliac Conder, a well-known civil engineer and writer. He died suddenly at Guildford on Wednesday, while reading in his study. He was for a great many years a contributor to our columns. Major Conder, the eminent Palestine explorer, is a son of the deceased.



ST PAULS. CHURCH. KENSINGTON ~ MR ARTHUR BAKER F R I B A ARCHITECT.

PHOTO-LITHO. SPRAGUE & Co. 37 MARTINS LANE, CANNON ST. LONDON, E.C.



Headquarters of Artists' Rifle Volunteer Brigade.

Illustrations.

ST. PAUL'S, KENSINGTON.

WE publish this week an interior view of the Church of St. Paul, Kensington (Mr. Arthur Baker, architect), of which we published an exterior view and a description in the *Builder* of November 30 of this year.

S.W. TOWER, SENLIS CATHEDRAL.

THIS tower is, says M. Viollet-le-Duc, one of the very few still existing which were built in the early part of the thirteenth century without any stoppage or hindrance of the work from commencement to finish. It is one of the earliest existing examples of an important steeple in which the upper part of the tower, as well as the spire, is of octagonal form. This arrangement gives great facilities for overcoming the awkwardness with which the octagon sits upon the square, and is a favourite one with modern architects. The open pinnacles that fill up the angles in this case might possibly perform their part more happily if they were a little more solid, but the skill which led their designer to incline the axes of the little spires that crown them is much to be commended. The same skill and taste are apparent in the design of the eight great dormers, which serve to blend the vertical lines of the tower and the inclined ones of the spire; which carry the light, open character of the composition into the spire itself and take the place of pinnacles around its base. The expedient of cutting down the backs of these dormers is a rather clumsy one, but it serves its purpose, and is not very noticeable.

The illustration is reproduced from a drawing by Mr. Arnold B. Mitchell, which was exhibited at the Royal Academy during the present year.

SCULPTURE — NEW LAW COURTS, BIRMINGHAM.

THIS is a reproduction from a drawing exhibited in the last Royal Academy Exhibition, showing the sculptural decoration of a gable in the new Law Courts at Birmingham, of which Messrs. Aston Webb & Ingress Bell are the architects. The figure in the gable represents Art, those below represent "Modelling" and "Designing" respectively.

The figures were modelled by Mr. W. Aumonier, who writes in regard to it, "The whole of the work was modelled in the open air on a gallery above the clay-pit at Mr. Edwards' Terra-cotta Works at Ruabon. This was done expressly that we might go continually 60 or 70 ft. below the work while it was in progress so as to judge what its effect would be when fixed in its proper position on the building. The centre figure is about 5 ft. high in execution."

SKETCHES IN CHELMSFORD.

THESE sketches, taken by Mr. J. W. Cobb of Chelmsford, represent some of the old picturesque corners in a town which has not been much illustrated.

There is no particular history attaching to the houses. Those shown in the larger of the three sketches in Moulsham are situated at the corner of what is known as "The Friars," but which was formerly "Friars Walk." At the other end of this "Friars Walk" once stood a Priory, belonging to the Dominican Friars, though now not a vestige of it remains.

Moulsham is one of the oldest portions of Chelmsford, and formerly was the property of the Mildmays, at one time one of the wealthiest and most powerful of Essex families.

THE ARTISTS' VOLUNTEERS' HEADQUARTERS.

THESE premises were opened by the Prince of Wales on March 25 last, as we mentioned at the time.

The façade of the new building is in the Renaissance style, with red terra-cotta dressings. The large medallion over the entrance was executed by Mr. Brock, A.R.A., who is a lieutenant in the corps. On the ground-floor is a large entrance, 10 ft. wide, with orderly, committee, officers' and commanding officer and adjutant's rooms, and a spacious drill-hall, 100 ft. long by 52 ft. wide, top-lighted, with a gallery at the south end, 52 ft. by 15 ft. In the basement are the armoury, rooms for quartermaster's stores, lavatories, and dressing-rooms for the men. On the first floor a large general room for the men, 52 ft. by 20 ft.; canteen, with lift to kitchen over, and sergeants'-room. On the top floor are dressing and bath-rooms, &c., for officers and sergeants, and accommodation for headquarter staff. The total cost of the new building, including furniture, has been 6,500*l.*, of which the officers, non-commissioned officers, and men have subscribed 3,200*l.*

The work was carried out under the honorary architect, Colonel Edis, by Messrs. Charles Kynoch & Co., contractors, Clapham.

BUNGALOWS FOR THE BELLAGGIO ESTATE.

THE house of which an exterior view is given is now being built on the above estate. The whole of the walls above the plinth, which is of red brick, are of stud work covered with Broseley tiles, with which the roofs are also covered.

The bungalow, of which an interior view is shown, has been built on the same estate. The whole of the house has been raised 8 ft. from the ground on dwarf stone walls, in order that the magnificent view may be seen from the windows of the sitting and bed rooms.

The sitting-room is panelled in oak, and the stud and plaster work is left exposed to view, and will be hung with tapestries; the whole of the woodwork throughout is stained very dark brown, and coated with boiled linseed-oil.

The walls above the balcony level are covered with tiles, and the roof is thatched. In the ingle nook a window, filled with bevelled plate-glass, is formed.

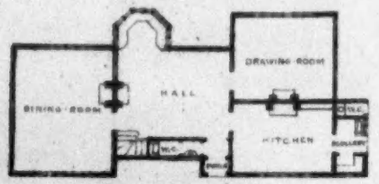
Mr. R. A. Briggs is the architect of both buildings.

THE BUILDER, DECEMBER 21, 1889.

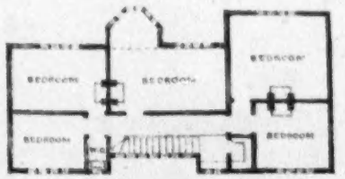
St PAULS. CHURCH. KENSINGTON ~ · MR · ARTHUR · BAKER · F·R·I·B·A · ARCHITECT.

Design for Bungalow for the Belluggio Estate to cost £400.

R. A. Briggs, A.R.I.B.A. Arch.t
2, Devonshire Square, E.C.



GROUND FLOOR PLAN



FIRST FLOOR PLAN

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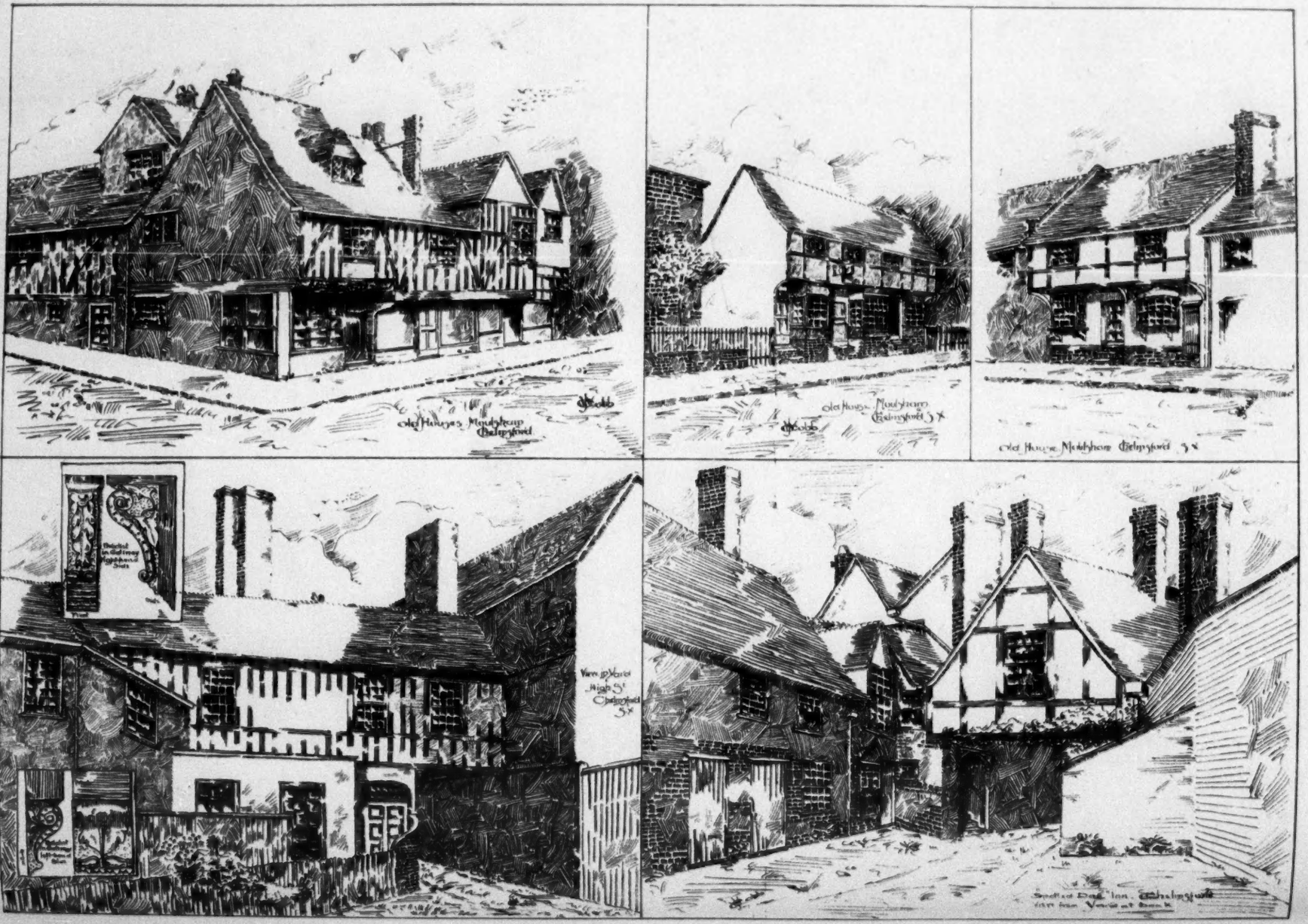
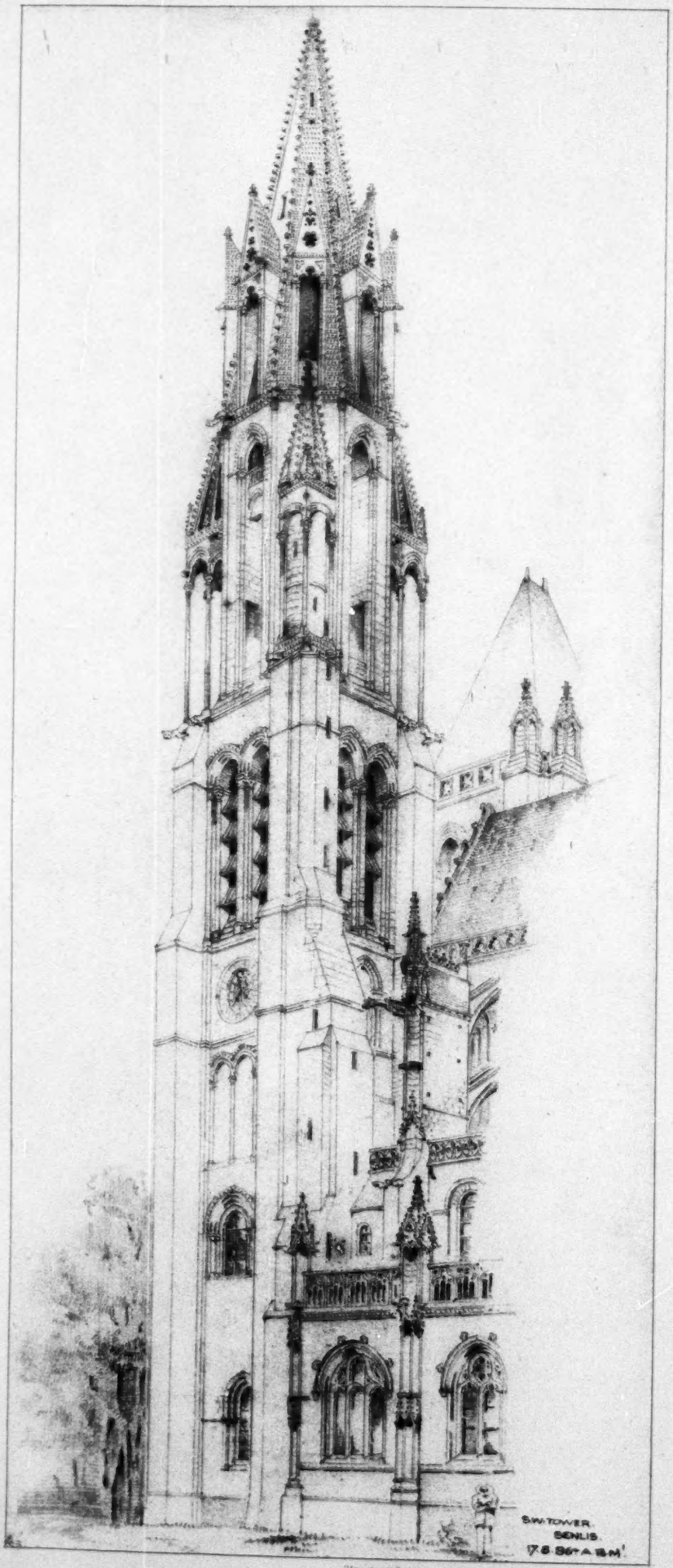

Old Houses, Moulsham, Chelmsford
Old Houses, Moulsham, Chelmsford
Old House, Moulsham, Chelmsford
View of Houses, High St., Chelmsford
Spotted Dog Inn, Chelmsford

SKETCHES IN CHELMSFORD.—By Mr. J. W. Cobb.



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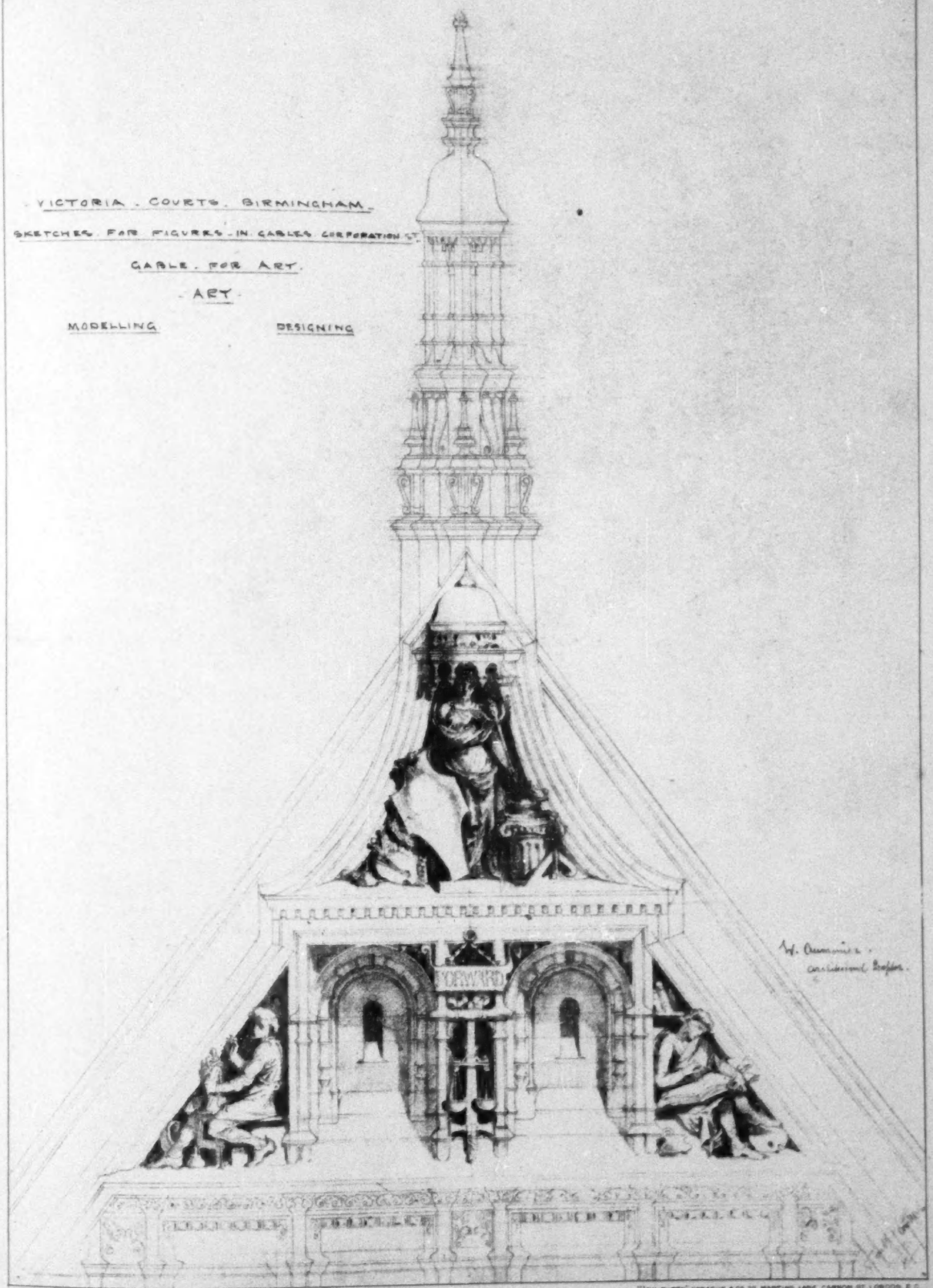
VICTORIA . COURTS . BIRMINGHAM .

SKETCHES FOR FIGURES IN GABLES CORPORATION ST.

GABLE FOR ART.

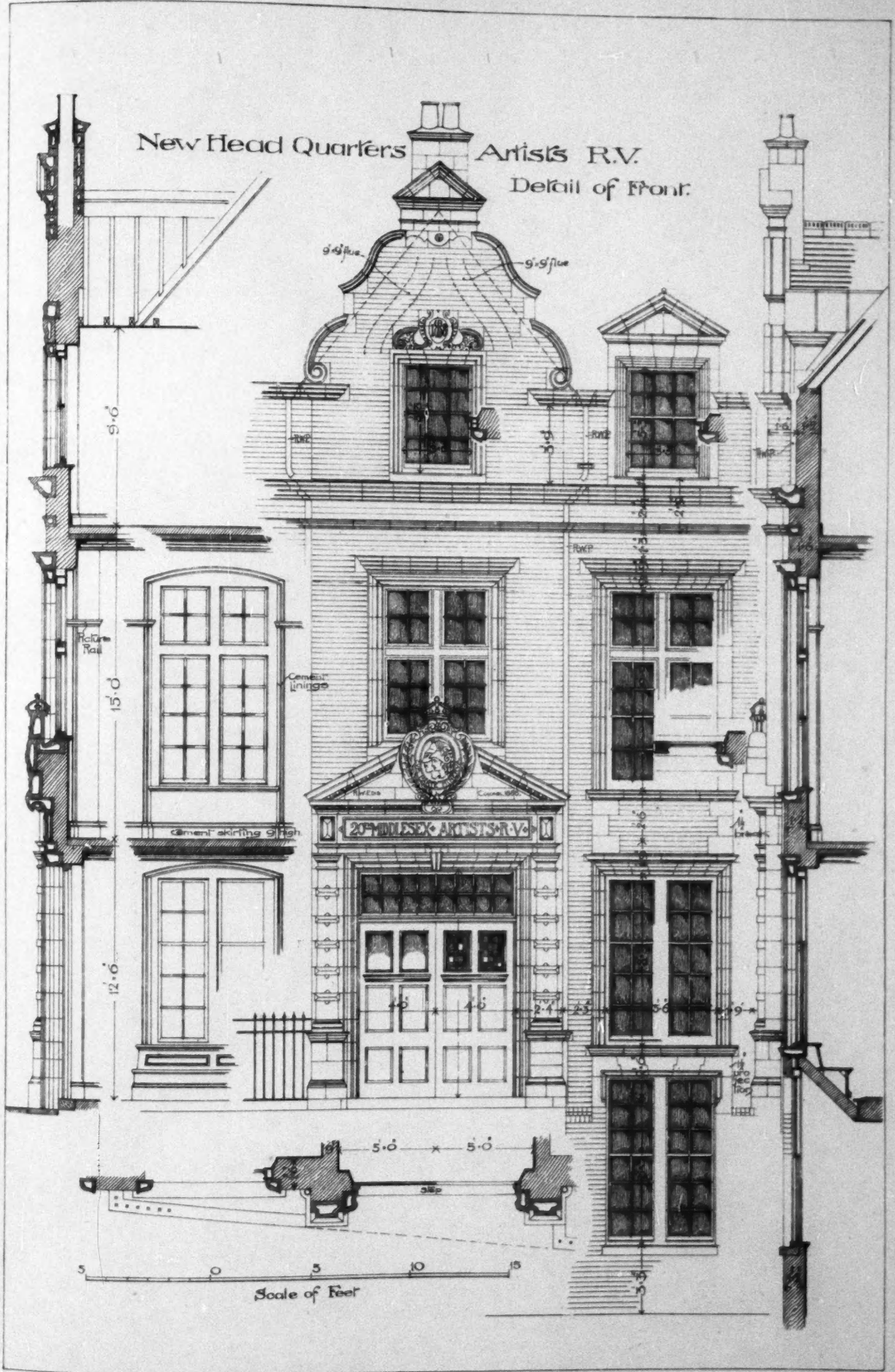
ART

MODELLING DESIGNING



W. Cummins.
Architectural Sculptor.

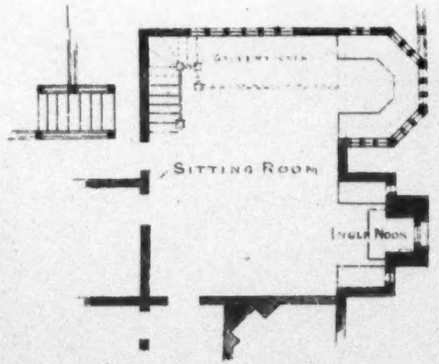
"THE PHOTO," SPRAGUE & CO., 22, MARTINS LANE, CANNON ST., LONDON, E.C.



HEAD-QUARTERS OF A RIFLE VOLUNTEER CORPS.—Col. Edis, F.R.I.B.A., Architect.

Sitting-Room in Bungalow for Quentin Esq^re Belgrave Surrey. R.A. Briggs A.R.I.B.A. Arch^t 2 Devonshire Square E.C.

Sitting-Room in Bungalow for C. Quentin Esq^re Bellaggio Surrey. R.A. Briggs A.R.I.B.A. Arch^t 2 Devonshire Square E.C.



Ingle Nook.

INK PHOTO. SPRAGUE & CO. 27, MARTINS LANE, CANNON ST. LONDON, E.C.

THE ARCHITECTURAL ASSOCIATION.

THE fifth meeting of this Association for the present session was held on Friday, the 13th inst., in the meeting-room of the Royal Institute of British Architects, Conduit-street, Mr. Leonard Stokes (President) in the chair.

The following gentlemen were elected members, viz.:—Messrs. O. E. Blayney, C. B. Hutchinson, H. Bulman, J. H. Bolton, O. G. Beater, J. Richmond, W. D. Goodwin, W. E. Hazell, A. R. Hennell, G. G. Irvine, and H. Bailey.

Mr. R. T. Blomfield, M.A., read a paper on "Drawing," which we print *in extenso* on another page.

Mr. A. B. Pite, in rising to propose a vote of thanks to Mr. Blomfield, said they ought to express their deep sense of gratitude to him for his paper. The subject was one of vital importance to them all, and although it was true that a comparatively small proportion of the members of that Association were architects, yet he hoped they were all architectural draughtsmen, and therefore such a paper as they had heard that evening was, he thought, of far more use to them as a body and as individuals than a good many other papers could be. He hoped they had listened to it with that amount of care and attention which would enable them to put into practice some of the truths and principles which Mr. Blomfield had so happily laid down. If Mr. Blomfield's own very successful work was based on those principles, the careful study of those principles by others ought to produce the same successful results. But it was, perhaps, to be regretted that Mr. Blomfield had confined his exhibition of illustrative drawings to the works of a few men who were on the fringe of architectural draughtsmanship—men whose genius and vocation lay, more or less, in the production of picturesque architectural landscape. It seemed to him that architectural draughtsmanship, practically speaking, as far as it concerned them, was very much connected with one or two historic facts. One of those historic facts was that they were now in the presence of some half-a-dozen weekly architectural journals, each publishing, on an average, from six to eight pages of lithographic drawings. But he regretted to say that they were indebted to those journals for the abolition, if not the extinction, of the highest form of illustrative architectural drawing, viz., the old steel-plate engraving, which had survived in the French school, but was absolutely a dead letter in English architectural illustration. No one could now afford to publish a book equal to one of Professor Cockerell's; the wind was taken out of their sails by the methods adopted for producing the illustrations,—the very popular and very successful illustrations,—in the architectural journals. They could do nothing but offer advice to these journals, and he thought that advice should be that they would much rather have one steel plate a week in the manner of M. César Daly* or Professor Cockerell, than the whole show of architectural illustrations with which they were deluged every week,—good, bad, and indifferent architectural drawing of every description. He was sure that instead of paying fourpence a week, some of them would be willing to pay one shilling a month and have one good plate, rather than the two or three dozen which they now got in the same time and for the same cost. There was much work illustrated in the present day which had no business to be illustrated, and by which architectural drawing was reduced to a very low ebb. It was no doubt true that architectural illustrations, drawn with delicacy and refinement, could not, except under exceptional circumstances, be produced by the thousand in a few hours, which was practically what had to be done by the illustrated weekly journals. These journals did their best, and they owed them a deep debt of gratitude; but for those journals the majority of them would probably never have become acquainted with the works of Mr. Norman Shaw; nevertheless they must protest against the photo-lithographic method of reproduction. It was to be regretted that no journal could now afford to give the time to the reproduction of drawings which represented real feeling,—generally pencil work,—such, for instance, as those that Prout's, or Cotman's, or Coney's generation knew. The art of lithography had, he thought, been killed by photo-lithography; the field which there used to be for architectural draughtsmanship on stone had been spoilt by photo-lithography. They were now told that they must do this and that in order that their drawings could be reproduced,—and their drawings were to be made with "the blackest of ink on the whitest of paper."* There were other processes for reproduction of drawings which were pseudo-technically known, he believed, as "stinking" processes, owing to the odours of the offensive chemicals employed; but he had seen as yet no results which would justify them in hoping very much from such processes. They could not hope to get Goupil photogravures in the weekly journals, but might hope to do so in a good monthly paper. Turning to another aspect of the subject, he had always regarded architectural drawing as being of two sorts, scientific drawing and imaginative drawing. An architectural drawing was, of course, in its origin and in its use a scientific drawing. They could make their drawing an actual representation of form or effect for sketch purposes, but when drawn for the reproduction of that form and effect in some material or other, and necessarily to scale, it was a drawing of a building or part of a building as it would never possibly look. It was in that sense so highly technical a production, being entirely without regard to atmosphere or perspective, or even colour or detail, that their simple scale drawing or full-size drawing was essentially a scientific drawing. It had to represent in the clearest manner the building which had to be erected. To make such a drawing perfect it would show plans, sections, and details mysterious to the uninitiated, carefully figured with detail, and with the materials indicated by the most gaudy colours; and it was thus their imaginative qualities were shocked rather than encouraged by architectural drawing. But they should always remember that with reference to the scientific in artistic drawing, there was the quality of drawing in their buildings. Just as there was the quality of drawing in sculpture and in painting, apart from the outline itself, he thought there ought to be apparent the quality of drawing in all their buildings, as executed, and not on paper only. With regard to form, there should be not only contrast of outline but a due proportion of light and shade. In the majority of buildings erected in the present day pilasters projected in a very haphazard sort of way, and had no relation to the surface which they broke up. The cornices, too, however well proportioned as to their sections, had no relation whatever to the proportions of the buildings they surmounted. Effects of light and shade, as well as contrast and form, in other words relief, were qualities of architectural drawing which could only be expressed in the building itself, for it was difficult to give them in a drawing. The French school tried to get their effect by a complicated method of shading on their drawings, but not altogether with the happiest results. As to imaginative architectural drawing, he did not see why they should be denied the liberty and opportunity of drawing for drawing's sake. Why should they not have just as much enjoyment in making a drawing as the artist who enjoyed sketching an old street? Even supposing an architect, by making a perspective of the building as he would wish it to look rather than as it would look when new, sinned a little against the proprieties, he could not but think that such a sin was one that was very near the borders of righteousness. He could not see, again, why in drawings sent in in competition by students in the Institute or Association the imaginative element should be interdicted for fear of causing a poor assessor to be deceived. He thought that the imaginative element should be recognised and encouraged as much as possible, and that men who could show that they had an imaginative ideal should not be snubbed. With regard to Piranesi's works, there were twelve or fourteen to be found in the South Kensington library, to which they ought to give their early attention, and there was also one in the Institute library. A good many of Albert Dürer's prints had been reproduced, and some of Cotman's drawings had been published in America, and, therefore, without going to museums they could get sufficient supply of imaginative drawings to feed the fire of their souls. In one of Piranesi's drawings which was exhibited that evening—the Temple of Peace, he thought—they had the idea of vast size. The building was a vast one, but Piranesi had endeavoured to make it look larger. It was his ideal. In the same way in Albert Dürer's drawings, the imaginative element was remarkably manifest by portraying, by mere force and power of line, the intensity of the scene represented. In the example of Samson and the lion nothing could be more forcible and nothing more practical and clear than the drawing of Samson tearing the lion to pieces. The way in which, without the slightest regard for perspective, Dürer managed the heavy lines just at the points where he required them to express force, was very instructive. Speaking of the "suggestive" school of drawing, he said that, clever as it was, it was possible to have too much of it. He warned his hearers against copying the tricks of that or any other school, for they were always in danger of falling into some trap if they copied. When they came to leaving out the outline of a building, representing chimney-stacks by the black mortar-joints, and omitting the arrises of the bricks, they were too clever. It was very dangerous to copy tricks, and gentlemen who started by copying the tricks of Samuel Prout, for instance, would certainly fall into ignominy. They must not think to get the same happy effects with splotches of black as Mr. Pennell or Mr. Railton. He remembered a friend who, full of enthusiasm for his art, was determined one day to sketch the cathedral of Prague, but he soon found that he could not get on very well, for he felt he had not a power of drawing commensurate with his sympathies. He would advise all students in a similar frame of mind not to be discouraged, for he (Mr. Pite) believed that no architectural draughtsman could obtain anything like facility until he had been patiently working for years. It was of importance that from the first they should aim at accuracy in their drawings. He was very much struck when he first observed that Sir John Millais's remarkably powerful method of drawing was entirely due to the exceeding care and diligent study with which he elaborated his draughtsmanship in his early life. Only those men succeeded in getting broad, brilliant effects with a few touches who had been accurate in their early drawing.

Mr. F. T. Baggallay seconded the vote of thanks, and said he should like to say a word or two about the importance of drawing, which it seemed some people were inclined to doubt. Even Mr. Blomfield had told them that a man could perhaps be a great architect without being a great draughtsman, and that was probably true if by a great draughtsman was meant one who was capable (like Mr. Railton) of representing picturesquely buildings that existed. But he (the speaker) did not for a moment believe that a man could be a great architect without being a very good draughtsman; for it seemed to him to be quite impossible for a man to conceive or originate in his mind a form which he could not draw with his pencil. He believed that the power to draw a thing meant a great deal more than the power to draw it; it meant that a man knew every outline and detail of it with exceeding accuracy. Before they could draw a thing really well, they must know it well. He knew a man who did not profess to know anything about drawing, but who knew a great deal about horses; and that man could draw horses with great accuracy, simply because he knew all about them. With reference to what Mr. Pite had said about steel engraving, if Mr. Pite would get somebody to start a monthly architectural journal which should produce steel engravings of the finest description, a nice opportunity would be offered for those prepared to buy; but it would also be a splendid opening for any publisher to drop a great deal of money.

The President, in putting the vote of thanks, said that there was no doubt that Mr. Blomfield was a thorough master of his subject, and he had touched upon various points which they would do well to consider. He (the president) thought that the first point they should seriously consider in drawing was, what the drawing was for. It was all very well to talk about a drawing, and to criticise it when they did not know the purpose for which it was made. If the drawing were intended for reproduction, it should be drawn for that purpose; and if it were a record drawing intended to represent a building in the best and most complete way possible, then they should disregard all thoughts of reproduction. He could not but think that the making of drawings with a view to reproduction

* Mr. Pite is under a mistake as to M. Daly's paper, the *Revue Générale*, which is a monthly and not a weekly publication; a fact which makes all the difference as to the style of illustration it is possible to produce.—ED.

* See our previous footnote to Mr. Blomfield's paper.—ED.

had done a great deal to deteriorate draughtsmanship. With regard to drawings made from ladders and scaffolds, a great deal might be learnt from the very act of making them; although their roughness and dirty state might make them perfectly useless as show drawings, yet the draughtsman would always retain mentally a certain amount of knowledge from having drawn any particular object. Many men, he believed, who sketched frequently and measured with great care hardly ever referred to the sketches and drawings which they made, but the fact of their having drawn objects in that way was sufficient to stamp them upon their minds and rendered it unnecessary for them to refer to their books. It was only men who did not study and draw who had to refer to books and papers for their inspirations. In making a drawing they should not forget the object as a whole, for it was a great mistake to go all over the drawing and to put in every imaginable scratch that they possibly could. They should grasp the thing as a whole, its outlines and proportions, and should not cross-hatch every possible bit of shadow. He was sorry Mr. Blomfield had said quite so much about drawings for reproduction, for he thought that they, as architects, should draw for their own information, and should make the representations of their buildings in an architectural manner. He rather agreed with Mr. Pite in thinking that they should not be prohibited from drawing a building as it would appear a few years after it was erected. He did not see why they should draw their buildings as they left the hands of the mason; for it was only fair to give their buildings a little time, so as to allow a few shrubs to grow up round them, and a few stains to appear on them. Mr. Pite had given them a very excellent address on drawing, and had pleaded for a certain amount of license in drawing, but he (Mr. Stokes) thought that that depended upon what the drawing was for. If they wanted an accurate drawing, they ought not to draw other than accurately. If a drawing was intended for a working drawing, it should be drawn as a working drawing; and if it was intended as a record drawing, it should be perfectly accurate, and, as Mr. Blomfield had said, with all its shadows, lights, &c. Mr. Pite had laid great stress upon accuracy; that was a lesson which young draughtsmen could not take to heart too much. Drawings were frequently exceedingly inaccurate, and consequently were practically worthless. Drawings were important things, but young draughtsmen must not be led away by the desire to make pretty drawings. They should always bear in their mind that architecture was their real end and aim. If they could make pretty drawings well and good, but they should always endeavour to make drawings which would be useful to them, and which would catch the whole spirit and object of the building which they were depicting.

The vote of thanks to Mr. Blomfield was then put, and carried unanimously.

Mr. R. T. Blomfield, in reply, said he had not much to add to what he had already said, but there had been one or two points raised in the discussion with which he would deal. Mr. Pite had referred to lithography. He (Mr. Blomfield) had at one time thought that a good deal might be done with lithography, but drawings reproduced by it had generally been unsatisfactory. By means of what Mr. Pite called "stinking" processes, drawings could be reproduced better than by means of lithography, and that was why he had called attention to the necessity of pen-and-ink work. He did not quite understand Mr. Pite's remarks about the quality of drawing in architecture and sculpture.

Mr. Pite explained that he had referred by way of illustration to the quality of drawing in a painting, a thing which would be perfectly easily understood, apart from the colour and the atmosphere, and simply regarded the representation of form; and when they looked at sculpture they might find exactly the same quality. When he looked at the elevation of a building, he wanted to see the quality of drawing in the elevation; he wanted to see that every form told,—apart from the colour of the materials, or in the absence of archæological or antiquarian interest,—that they were there naturally, and that the architect had studied the drawing of his building in brick and mortar. By such drawing he meant form, apart from outline, governed by shadow and light rather than by the interest of outline and good proportion alone.

Mr. Blomfield said that he thought he understood Mr. Pite, but he dissented from the use of the term "drawing." If they got in sculpture the quality desired by Mr. Pite, he thought they ought rather to call it "modelling," while it would be "form" in architecture. Sculptors were very chary about using the pencil; they preferred the thumb. The architect's drawing, after all, was only a means to an end, and Mr. Phené Spiers, in a note to a paper read at the Institute a few years ago, referred to the French method of showing the relief or projection in drawing by means of conventional shading, by which it was claimed that they could show all the qualities of relief, and so on. He (Mr. Blomfield) thought this system not so clear or so easily intelligible as the English methods of working by scale on the one hand and perspectives on the other. As to the "suggestive" sketching, about which something had been said, it was being very much overdone, but in skilful hands it was a method of great value. There was one thing to be said for it, however, and that was that when they saw a thing at a distance, they did not see the detail, but the shadows, and the impression of the thing which the eye took in was the dark part. Mr. Baggallay had referred to what he had said about fine draughtsmanship not being an absolutely necessary qualification of a great architect. He (Mr. Blomfield) had rather spoken against his own convictions on the matter, for he thought that a great architect must be a fine draughtsman, in so far as that he should be able to draw the figure, and any flower or animal which took his fancy. He did not see how any one could make a good decorative design unless he could draw an animal or a flower properly. The President had referred to the reproduction of drawings as having had a bad effect upon draughtsmanship. If they had any *arrière pensée*,—if they thought they were making their drawings for reproduction, and were not thinking of what they liked themselves in their drawings, there was always a tendency towards affectation; there was a tendency to sink that individuality which it should be their primary object to develope. In work for reproduction they saw that certain things "took," and the tendency of the young draughtsman was to imitate such work. As to the point of architectural drawing, his view was that they could do one of two things. They could either draw as Piranesi did, using architecture as the material for their imagination, or they could draw architecture as Inigo Jones used to draw it. It was extraordinary to see the way in which Piranesi had taken architecture pure and simple as his groundwork, and thought out his ideas in architecture. The figures which he had put into his drawings had been abused by many people, but they were not of the essence of his designs. An exceedingly able design by Mr. Pite, made about five or six years ago, and which bore the motto "El Dorado," was another instance of imaginative drawing of architecture, and in this there were practically two designs, the architecture itself, and the drawing of it in black and white. It certainly showed that Mr. Pite had given himself a considerable amount of the licence and imagination in design for which he had pleaded. Inigo Jones's drawings gave one the impression that he simply dashed on to paper what his notion of a building was, and when he had finished that he left the thing then and there; and that was the other way referred to of making an architectural drawing.

THE LONDON SEWAGE QUESTION.

Sir Robert Rawlinson, K.C.B., read an important paper on this subject before the Society of Arts on Wednesday evening. The greater portion of the paper was devoted to a historical sketch of the subject. The latter part of the paper, which contains his conclusions, is as follows:—

Sewage irrigation has been carried on in England and Scotland a sufficient length of time to show that it is the cheapest and most effective mode of treating sewage yet tried, and where land is obtainable at agricultural prices, and the sewage can flow to the land, that there an income can be earned by the process. There are some thirty or more places in England where sewage irrigation has been in use a sufficient number of years to permit inquirers to be satisfied with the results, as at Banbury Lodge-Farm, Barking, Bedford, Birmingham, Blackburn, Cheltenham, Chorley, Croydon, Craigentinney-meadows, Doncaster, Harrogate, Leamington, Merthyr Tydfil, Oxford, Rugby, Tunbridge Wells, Warwick, West Derby, Wolverhampton, and Wrexham.

At Berlin, the sewage of the city is lifted by steam-power to a height of 130 ft., at a cost of 12,000*l.* per annum. Upwards of 2,600 acres have been purchased at a cost of 400,000*l.*, and this land is laid out and cultivated under sewage. The distance of the sewage farm from Berlin is about ten miles. The City authorities are said to be satisfied with the results. Paris has appropriated land for sewage irrigation for some years at Gennevilliers and some other places, to the extent of 12,350 acres. Steam-pumping power is used, and the river Seine is crossed. The municipality is so satisfied with this work, that the engineer, the late M. Durand Clay, is to have a statue.

Irrigation has been practised in China, Japan, Ceylon, and Italy, upon an enormous scale, time out of mind; and in England water-meadows are successfully cultivated. At Edinburgh, the sewage-grown grass feeds dairy-cows, the milk being used in Edinburgh. The London sewage may be turned into milk and butter which will be wholesome.

The volume of crude sewage to be dealt with, if taken at 150,000,000 gallons per day, will represent 670,000 tons. Containing, say 150 grains of solids per million gallons, it will about equal 10 tons of sludge per million. (?) So that 150,000,000 gallons will represent 1,500 tons per day of sludge to be removed in barges. So that there will be 547,500 tons of sewage-sludge to remove or get rid of, per annum. To consolidate it by sludge-presses at 2*s.* per ton, would cost 54,750*l.* per annum. To barge it to sea, there must be not fewer than six of the largest class, as the out-and-home voyage will be about seventy miles. Each barge to take 1,500 tons of sludge, containing, at 90 per cent. of water, 1,350 tons of water to 150 tons of solids. But on testing the barge load before discharging it, 95 and even 97 per cent. of water was found. Taking, however, 95 per cent., there will be 1,425 tons of water to 75 tons of solids. Did it ever before enter into the heads of any body of men—engineers and representatives of vestries—to perpetrate such operations? It must be remembered that the crude sewage flows to the outlets with its solids, and if pumped into the proposed sewage canal or conduit, would flow to the North Sea, or on to any land used for irrigation or warping, as at Foulness Island.

It is not my intention to raise the chemical question as to the use and sort of chemicals for sludge disinfectants; this I must leave to the chemists. The sludge-tanks, and the sludge-barges, will in hot weather become putrid, and to arrest this chemicals may be used, the cost being estimated very high. With fresh sewage flowing at once over land or to the sea, very few chemicals need be used: the land will at once disinfect. The sea will at once dilute and disperse, as at Liverpool, where the crude sewage of Liverpool, Birkenhead, and all the towns on the river and estuary pass harmlessly to sea.

Contracts were let on the eve of closing the old Board to the extent of 741,000*l.* Add to this extra land, fencing, workmen's houses, new mud-barges, at more than double cost by reason of the rise in iron, steel, and labour, and it appears to me that the legacy in this form will exceed 1,000,000*l.* sterling. Interest on this with maintenance will be fully 5 per cent., which will equal 50,000*l.* per annum. Wages may be 50,000*l.* a year. The cost of chemicals will be in proportion to the quantity used, and may range from 50,000*l.* up to 100,000*l.* per annum, or 200,000*l.* per annum on the whole. And all for what? Not to prevent pollution of the Thames, as the clarified sewage will ferment in the river, will kill fish, as at present, and make the water foul-looking and offensive. Chemicals have been tried at many places to see if they would purify sewage, but ever with the one result,—namely, to produce an effluent which becomes putrid, offensive, and dangerous. The new works land the County Council in a debt of about 1,000,000*l.* sterling, with an annual cost of probably 300,000*l.* per annum, and a polluting effluent. A vast nuisance establishment of sixty acres in extent!

It is never good policy to use hard names I admit, but I may quote an established proverb, and say, that these Barking and Crossness Works, as a gift to the new County Council, are equivalent to an entire herd of white elephants. Among the suggested new works are pumping-engines and apparatus to lift the

sewage to the new sewage conduit, say at a cost of 100,000*l.*, or 46 miles of new conduit, at the estimate put down by the referees for the cost of their proposed southern and northern outfall sewers, which together measure 47 miles, estimated at 3,144.300*l.* Pumping-engines will make a total cost of 3,244,300*l.*, which at 5 per cent. for maintenance and redemption will amount to 162,215*l.* per annum to be set against 300,000*l.*, the probable cost of the works in progress.

I will not encumber this paper with any definite estimate as to income from sewage farming, as this will involve the question of purchase of right of way for the sewage conduit, and for outlet works. This feature of the scheme must grow with time. Areas for sewage irrigation may be formed to any extent, from 10,000 up to 50,000 acres, and there will be sewage enough and to spare for this large area. The agricultural value of town sewage has been tried and estimated, over and over again, both in England and on the Continent. A Royal Commission, with the honoured name of Sir J. B. Lawes, Bart., at its head, estimated the commercial value of crude sewage at 2d. per ton to a farmer, taking it as he wanted it; but only at 1½d. per ton if he must take it and dispose of it all the year round. The London sewage is the richest known in manurial ingredients, and amounts in daily volume, at its lowest estimate, to 670,000 tons, which at 2d. per ton will amount to 5,583*l.*, and at ½d. per ton to 1,395*l.* per day, or about two millions sterling in the one case, and at ½d. about half a million sterling. I cannot help dealing with these figures, enormous as they are; but when I know that cultivated sewage lands bring in, year by year, rentals of from 15*l.* to 20*l.* and even 30*l.* per acre, there must be more than a grain of truth in these very large figures. I do not, however, plead for the purification of the Thames on the score of any probable income to be derived from sewage farming, as this would be begging the main question, which is to free the river Thames from pollution by a sewage conduit, and additional steam pumping sending it eastward, once and for all, to the great North Sea, and let reclamation of land and sewage irrigation follow.

The length of the conduit from Abbey Mills, eastward to Foulness Island, Southminster and Burnham Marshes, will be about forty-six miles, through an agricultural district, and sea outlets must be provided along this shore over the Maplin Sands to low water of spring-tides. This I consider is a work necessary to be done, if it could even be proven to be as fruitless of pecuniary results as the sewage precipitation and mud-barge process.

The conduit will be a canal, or new river, for the conveyance of sewage in its fresh state, along which it will flow unceasingly at not less than two miles in the hour, to be as unceasingly disposed of at the eastern terminus. The question may be put—But will it not be a nuisance to the neighbourhood in its course? My reply is, that the works must be designed and be executed so as not to be a nuisance. Portions will be covered, portions will be in tunnel, and some portions may be open, but at no point need there be one-tenth the nuisance there is now at the existing outlet works, nor more than at a well managed sewage farm, nor so much as from a heavily manured field.

The New River at London has a grade, or fall, of 6 in. per mile, and this inclination may be given, by similar means, to produce this grade; but there must be a head of 23 ft., not, however, necessarily at one point, but subdivided at several points; the reaches from fall to fall being level, velocity being obtained by overfall-weirs and sluices. The Bridgwater Canal is thirty miles in length, from Manchester to Runcorn, of course level, the outlet being by locks at Runcorn. The rate of flow is about one mile per hour. The flow along the London sewage-conduit is to be two miles per hour, so that the sewage of each day will be carried, from the junction with the metropolitan sewers at or near Abbey Mills, to the outfalls to the sea in twenty-three hours.

Mr. R. Etheridge estimated the value of London sewage for Messrs. Douglas Galton, James Simpson, and Thomas C. Blackwell, as under:—

Thames Mud.—Thames sewage is composed of animal matter, vegetable matter, human excreta in a state of decomposition, and living organisms of the class infusoria, diatomaceæ, zoophyta, and crustacea. The detritus consists of crushed road and street material, such as granite and other crystaline rocks, crushed flint, gravel, and earthy deposit. This is termed "crude sewage."

Analysis.—From the analysis of mean samples of crude London sewage, it was found that 100 tons of liquid possesses a value of 17s. 7d. The suspended matter, "mud," is worth 2s. 2½d. The clarified liquid is worth 15s. 4½d., so that the cost of precipitation obtains in money value about one-seventh that of the entire sewage, and this is to be barged to the sea, whilst by far the largest value is to be sent to the river. If this would not putrify and pollute the river, there would be so much in its favour, but as seven-eighths of the salts of sewage remain in the fluid, plus some of the chemicals used, that which is most valuable as manure is wasted, and the injurious pollution of the river is continued.

The entire volume of the London sewage at 2,145,500 tons per annum, at 17s. 7d. per 100 tons, is worth upwards of 1,750,000*l.* sterling; but twenty-five years ago the London sewage was valued at 1,000,000*l.* sterling.

Along the entire line of the proposed sewage conduit, sewage may be supplied to farmers, and dairy-farms may produce milk for London. Italian rye-grass may be grown and sold, as also turnips, mangolds, and other crops. In warm and dry summers hay may be made, and in wet seasons silces. Land is not corrupted by sewage irrigation, but is improved, as the solids out of 100 tons spread over one acre of land would not give a surface deposit of 1-100th of an inch in thickness. In warm summer-time 1,000,000 gallons of sewage may be utilised on one acre in one day, and where something like this volume is used, and the land is light and porous, a very small volume drains from the subsoil. In exceptionally hot weather no water flows from the land.

Where chemicals are used for precipitation and the water so clarified is turned out unfiltered through land, and cattle drink it, the milk is not fit to be used. Cows, will, however, drink crude sewage without apparent injury, but they had better have clean water supplied.

The Sludge and Sludge Barges. — It will be possible to send sludge, having 90 per cent. of water, to any distance in open troughs or pipes, to be used in warping low land, and this mode of disposing of it will be far cheaper than barging it to sea. Enormous quantities of sand are dredged and passed through pipes to the shore. Diluted clay in brick-fields is also sent along open troughs considerable distances, and this form of conveyance for the sewage sludge may enable the County Council to dispense with sludge barges.

I say that this or some similar work must be carried out to free the River Thames from pollution, and that for this purpose the Barking and Crossness outfalls must subsequently be so altered, modified, and dealt with, as not to pass any sewage to the Thames, but by a tunnel from Crossness to Barking, with the engine-power to lift the combined volume to the new canal or conduit. And that the crude sewage may freely and easily flow along the new conduit, to be used in irrigation, and so much as may not be so required in winter or in wet seasons can be passed on to the North Sea, in the way it now flows along the London intercepting-sewers to the present outlets, so that it will not be necessary to remove, by precipitation, one pound weight of sediment, or use any chemicals, as the whole will flow in one continuous stream, at a rate not less than two miles per hour; and properly-constructed apparatus can be adapted to float along the conduit, sweeping onward any deposit there may be.

This paper is a brief statement of the main sewerage of London, which most undoubtedly is a grand work for the Metropolitan Board to have devised and carried out for the metropolis, and if it had been as wise in its day and generation in devising proper works for dealing with the sewage so as to purify the Thames without any outfalls to the river, it would have deserved a permanent memorial to be a record of its great work, which all men might see and read through all succeeding time. But it has blundered over the Thames purification question until, in its last days, it has handed over abortive works which will cost the County Council not less than a million sterling to get rid of. But must this work remain? I say no, and no. It both must and will be abolished.

Look at this mighty city of London, with its millions of inhabitants; look at the beautiful river, which flows gently down in silver sheen from its upper reaches, and supplies wholesome water for the swarming population inhabiting its banks; look again at its lower reaches, the great highway to all the nations of the earth, whose ships, laden with the produce of all climes, crowd the wharves and docks; and then say if the final result of the main drainage question shall be to leave the grand old river a black, loathsome, stinking ditch! My final conclusion is that the sewage must be disposed of out of the River Thames.

An animated discussion followed, in which the Chairman (Sir Henry Roscoe, F.R.S.), Mr. Rhodes (ex-Chairman of the Main Drainage Committee of the London County Council), Sir Frederick Nicholson (Chairman of the Thames Conservancy), Mr. Æneas Smith, L.C.C., Dr. Alfred Carpenter, Colonel Jones, V.C., and other gentlemen took part, and the further discussion was adjourned.

THE LONDON COUNTY COUNCIL.

THE last meeting of this Council for the present year was held on Tuesday last at Guildhall, Lord Rosebery presiding.

City Charities and Technical Education.—After the transaction of some formal business, the Council proceeded to consider the Report of the Corporate Property, Charities, and Endowments Committee on the City and Parochial Charity Schemes. Lord Hobhouse, the Chairman of the Committee, moved the adoption of the Report, which contained the following among other recommendations:—

"(1.) That the Council do authorise this Committee to send in to the Charity Commissioners objections and suggestions of the nature as follows:—

As regards time.—(*a*) In the case of schemes so novel, so complex, dealing with such large funds, affecting such vast masses of people, and even now so incomplete, a much longer time for enquiry and consideration should be allowed before the Charity Commissioners send them up to the Education Department, even though the delay should necessitate a prolongation of the Act of 1883.

As regards the separate Parish Schemes—(*b*) The Governing Bodies are of too exclusively parochial a character. (*c*) The Governing Bodies should not be ordered to exclude their non-parochial members from an important class of business. (*d*) The Governing Bodies should not be forbidden to use the buildings for political, denominational, or sectarian purposes. (*e*) Alterations of the scheme should be made by scheme.

As regards the Central Scheme—General Property.—(*f*) The scheme should not attempt an immediate exhaustive application of the funds in perpetuity or for many years. (*g*) It should not give the bulk of the funds to a class of institutions (Polytechnics) not yet sufficiently tested in point of time or in number of experiments, so as to show that they will supply the needs of the poorer inhabitants of the metropolis, and are capable of being managed satisfactorily under permanent schemes. (*h*) It should admit greater freedom in the choice of objects by the Trustees. (*i*) In the case of libraries, it should not concentrate them in or close to the City; and it would better consult the welfare of the poorer inhabitants of the metropolis by establishing branches or separate libraries at distant points. (*j*) These ends will be best secured by beginning on a more modest scale with such objects as are selected in the first instance; and by leaving to the Trustees a large amount of funds to work upon, a large discretion within the limits of section 14 of the Act, and time to select localities, to consider modes of expenditure, to watch occasions, and to make bargains and arrangements with other persons and corporations.

As regards the Central Scheme—Ecclesiastical Property—(*k*) The large funds devoted to repairs and restorations, and to maintain the fabrics, staff, and services of the City churches, will be mostly wasted. (*l*) If the scheme gives more to useless objects than the Act requires, the Commissioners should be asked to modify it in that respect. (*m*) Such waste as the Act may be found to compel should be brought under the notice of Parliament.

As regards the Central Scheme generally—(*n*) The twelve trustees not provided for by the Act should be appointed, as far as possible, by elected bodies representing the inhabitants of London. (*o*) Subject to the present obligation of admitting appointees of the Ecclesiastical Commissioners, four trustees should be appointed by the School Board and eight by this Council. (*p*) The trustees should not be compelled to transact any portion of their business by committees constituted beforehand for them by the scheme.

(2) That the Council do authorise this Committee to enter into such communications with the Charity Commissioners as occasion may require.

(3) That copies of the principal report be sent to the Charity Commissioners, and, at a fitting time, to the Houses of Parliament, and to such persons or bodies as this Committee may from time to time think fit.

(4) That this Committee be instructed to cause the principal report to be printed in a form more suited for general reading."

These recommendations gave rise to a protracted discussion, in the course of which there was a great deal of wild talk about pulling down the majority of the City churches instead of maintaining them in repair out of the charity

funds. But by a large number of the Councillors the Committee's report, especially section *g*, was regarded as "throwing cold water" upon the Polytechnic schemes, whose interests were championed by Alderman Evan Spicer, Alderman Quintin Hogg, and Councillor Earl Compton. Councillor Spicer moved, as an amendment:—

"That whereas the report of the Corporate Property Committee on the schemes of the Charity Commissioners calls in question the public benefit to be derived from the establishment of Polytechnic Institutions throughout London, and whereas during the last two years the schemes of the Commissioners have been thoroughly discussed, and have received the approval of the public, as shown by the large amounts of money (almost equal to those proposed to be provided by the Commissioners) which have been voluntarily given for the promotion of the same objects, the Council is unable to agree with the recommendations of the Corporate Property Committee as they now stand."

This was rejected by 53 votes against, to 49 for, and the various recommendations were then agreed to with certain slight amendments.

The Main Drainage Question.—The Council then proceeded to discuss the following report of the Main Drainage Committee:—

"Your Committee have considered the report of Mr. Gordon, urging the provision of two more sludge vessels, and have also considered his question as to whether this is the proper way of dealing with the sludge. He had no doubt that it is the least expensive way of disposing of this residuum. Your Committee, agreeing entirely with the Royal Commissioners' report of 1884, that it is neither necessary nor justifiable to discharge the sewage of the Metropolis into any part of the Thames from the Nore upwards, are of opinion that any process of precipitation and of separation of effluent and sludge must necessarily be carried on where the late Metropolitan Board have engaged their successors in connexion with an outlay upon works of nearly 800,000*l.* for that purpose. Your Committee are convinced that the probable alternative will be found to be the conveyance of the sewage to the sea upon the Essex shore, by some such plan as that sanctioned by Parliament in the Act of 1865. But your Committee observe that their immediate and unavoidable duty is to promote the best and most complete use and employment of the works committed to their charge, which are already in a condition to produce as much sludge as four vessels can remove. They, therefore, recommend:—

'That tenders be obtained for the construction of two sludge vessels, upon the model of the older and less costly ship, with certain modifications to be described by the engineer.'"

This gave rise to a prolonged discussion, in the course of which,

Councillor Æneas Smith moved the following amendment:—

"That, before deciding to acquire additional sludge vessels, this Council desires further information upon the question of sewage disposal, more especially with a view to the prevention of disease and freeing the river from pollution; it therefore instructs the Main Drainage Committee to secure the services of an eminent civil engineer to join the Engineer of the Council in a thorough examination of the whole sewage system. And that the engineers be instructed to include in their report an approximate estimate of the cost of taking the whole sewage to the sea in accordance with the recommendation of the Royal Commission, 1884. That, pending the presentation of the above-mentioned report, estimates be obtained from shipowners and contractors to carry the sludge to sea for one year from April 1, 1890."

This was debated for some time, and on a division being taken the amendment was carried by 50 votes for, to 44 against.

Waterlow Park.—Councillor Phillips, on behalf of the Parks and Open Spaces Committee, announced that on the previous day Sir Sydney Waterlow had executed a deed of gift of the estate at Highgate, now called Waterlow Park, and had handed in a cheque for 6,000*l.* in addition. It was also stated that in a few weeks the Parks Committee would report as to what steps would be taken in regard to the ground.

The Site of the National Portrait Gallery.—In regard to this question, it will be remembered that at a previous meeting of the Council the Corporate Property and Improvement Committees presented divergent reports* respecting the line to be recommended to the Council in the negotiations with the Government as to the vacant land in Charing Cross-road, opposite the site of the National Portrait Gallery. The consideration of the question was then adjourned, and the two Committees now presented a joint report, which was as follows:—

"Since the last reports of these Committees, made on the 26th of November last, an interview has taken place between the Chairman of the Council, the Chairmen of your two Committees, and Mr. Primrose on behalf of Her Majesty's Office of Works. We are pleased to be able to report that in consequence of this interview Her Majesty's Office of Works has made new proposals more favourable to the public of London. It is now proposed, on behalf of the Crown, first, that as regards the plot of land belonging to the Council, the strip marked on the Council's plan, containing about 900 square feet, shall be thrown into Charing Cross-road; and secondly, that the Crown shall give up a strip of the Crown land at the north-east of the National Gallery, measuring about 575 square feet, also to be thrown into Charing Cross-road. This strip is defined by a line drawn on a plan transmitted by the Office of Works. Both Committees are of opinion that the arrangement now proposed should be carried into effect, and the respective Chairmen have been instructed to sign a joint report to the Council for that purpose. The two Committees recommend:—

"(a) That arrangements be made between the Crown and the Council by which:—First, a strip of land belonging to the Council, defined on the plan submitted to the Council, and measuring about 900 square feet, shall be thrown into Charing Cross-road; secondly, a strip of land belonging to the Crown, defined on the plan furnished by the Office of Works, and measuring about 575 square feet, shall be thrown into Charing Cross-road; and thirdly, the Council shall convey to the Crown, for the price of 7,000*l.*, the remainder of their plot of land which abuts on Hemming's-row.

(b) That it be referred to the Corporate Property Committee to take all proper steps to effect the transfer of the land, and to the Improvements Committee to carry out the widening of the road.'"

This was unanimously agreed to without discussion, Lord Rosebery remarking that he thought this was a very satisfactory settlement of the question.

By-Laws as to Drainage.—On the motion of Councillor Beachcroft, it was unanimously resolved,—

"That, while considering the question of by-laws as to drains, referred to the Sanitary Committee on October 29, that Committee be requested to consider as to the steps, if any, which should be taken for so regulating the construction and maintenance of the ventilating shafts, now commonly carried up to the tops of houses as to prevent danger from sewer gas, and that the inquiry be extended to the case of street ventilators."

The Council then adjourned until Tuesday, January 14, 1890.

* Both reports were printed in the *Builder* for Nov. 30, pp. 387–88.

ARCHITECTURAL SOCIETIES.

Birmingham Architectural Association.—On Tuesday last, at a well-attended meeting of the Birmingham Architectural Association, a paper entitled "Towers and Steeples," was read by Mr. A. B. Mitchell, A.R.I.B.A. The subject was dealt with in a very comprehensive and complete manner, and was illustrated by a number of excellent drawings of English and Continental examples. Mr. Mitchell, in closing his paper, deduced from the examples he had quoted the principles which seem essential to successful designing of towers, drawing especial attention to the means by which an effect of equal richness was attained throughout the height, and to the manner in which the difficulties of the connexion of tower to spire were overcome by the Mediæval builders. The meeting closed with a hearty vote of thanks to Mr. Mitchell, moved by Mr. T. Naden, president, and supported by Messrs. Doubleday, Henman, Newton, and Bidlake.

Edinburgh Architectural Association.—At the fortnightly meeting of the Edinburgh Architectural Association, in the hall, 42, George-street, on the 12th inst., Mr. G. S. Aitken gave a lecture on "By-paths in Architecture." Professor Baldwin Brown, President of the Association, occupied the chair. Mr. Aitken, according to the report in the *Scotsman*, regarded as by-paths such subjects as landscape-gardening, geology, painting, archæology, heraldry, and music; and he dwelt on the necessity for the architect having some by-path or hobby to follow independent of, and yet to a certain degree in line with, ordinary professional work. Of landscape gardening it was remarked that its practice required a knowledge, among other matters, of plants and their habits, shrubs and their effects, and of trees and their forms and leafage, and, if deciduous, their appearance at the varying seasons of the year. As regarded geological study, it was observed that the architect would be specially interested to learn what immunity his buildings might enjoy from the wearing natural action of rain, frost, and sun-heat, or of the destructive effect which the artificial agencies of city and industrial life might have on his carefully-designed works. Under the head of painting, the introduction of coloured materials into modern external architecture was alluded to, and the good effect of the red-tiled and stone-slated roofs of some of the old Surrey and Lancashire mansions was illustrated by sketches. The untrueness to fact of black-and-white exhibition drawings was pointed out, and that was adduced as a probable reason why the public took so little interest in the architectural rooms of art exhibitions. The employment of water-colour was advocated as the proper medium for representing architectural work. The study of archæology was illustrated by an analysis of the north transept of Furness Abbey compared with the co-eval and corresponding one of Kirkstall. Alluding to the need of some monographs of the more important Scottish ecclesiastical buildings, Mr. Aitken suggested that it might be a wise thing for the Edinburgh Architectural Association to foster such a scheme by offering out of its superfluous funds prizes for the best sets of measured drawings of some of our Scottish abbeys, as Melrose and Holyrood. References to the desirableness of a knowledge of heraldry and music brought the lecture to a close, the lecturer speaking of organ construction and church-bell ringing under the latter head.

Manchester Architectural Association.—The fourth ordinary meeting of this Association was held on Tuesday evening at the Diocesan Buildings, Mr. E. Hewitt in the chair, when a paper was read by Mr. F. Bennett Smith, entitled, "A Visit to the Doulton Pottery Works, Lambeth." After giving a general description of the history of these works and referring to the art industry carried on there, he mentioned the improvements in sanitation. In speaking of the ornamentation of buildings, Mr. Smith asked, why cannot we introduce colour into the exterior designs of our buildings? Surely the time is not far distant when we may see blocks of coloured stoneware, relieved with glazed decorations, taking the place of stone and brick as building materials. Stoneware was not so likely to be discoloured by atmospheric changes, and such coloured materials would be permanent decorations. It was union amongst all lovers of art which would make such a great reform in our street architecture, which was so needed in this city. Messrs. Barker, Davies, Hodgson and the Chairman took part in the discussion following.

Royal Institute of the Architects of Ireland.—On Saturday last the annual general meeting of the Royal Institute of the Architects of Ireland was held at 37, Dawson-street, Mr. Thomas Drew in the chair. Mr. Albert E. Murray, hon. secretary and treasurer, read the report of the Council. The Council recorded with regret the death of Sir Charles Lanyon, of Belfast, one of the oldest members. The number of members had increased during the past year. Mr. W. H. Lynn's term of office as President being about to expire, it had become necessary to hold a ballot for the purpose of appointing a successor. Three gentlemen, one each from Dublin, Cork, and Belfast, were recommended to the rank of Fellows of the Institute. The Council had not seen their way to take an active part with regard to the Plumbers' Registration Association established early in the year, but they sympathised fully with its objects. The Council felt justified by the course they had adopted with respect to the Architects' and Engineers' Registration Bill by what had occurred. The subject had now been dropped, and was not likely to be revived until it was taken in hand by the British Institute, together with its allied societies. They thought it a matter for congratulation that they did not identify themselves with a project which had so completely failed. They looked forward to a not distant day when the question should be ripe for settlement, and when united action should be taken by the representatives of all the chief architectural societies in the kingdom, and the matter set at rest. At the examination held under their auspices last month, six candidates passed, which was regarded as encouraging. The Institute during the past year had formed an alliance with the Royal Institute of British Architects and the various provincial societies throughout England, Scotland, and Ireland, without sacrificing their independence of action. The result would be that their profession would be able to control legisla-

tion* and give effect to the views of the profession at large. — The statement of accounts, which was considered satisfactory, was also read. The report was adopted. A discussion took place on the question of the Loop Line Railway, and, by a majority of 12 to 5, it was decided to present an address to the new Lord Lieutenant protesting against the objectionable character of the proposed viaduct across Beresford-place. The following is the result of the elections for officers:—President, Thomas Drew; hon. secretary and treasurer, Albert E. Murray; Council, Sandham Symes, J. J. O'Callaghan, J. R. Carroll, Geo. C. Ashlin, Chas. Geoghegan, Wm. Mitchell, Thomas N. Deane, J. L. Robinson, J. H. Pentland, and R. C Millar; auditors, W. H. Byrne and T. M. Deane.

LIGHT AND AIR CASE.

MYERS *v.* CATTERSON.

THIS case was before the Court of Appeal on Saturday and Monday last, Lords Justices Cotton, Bowen, and Fry, being on the Bench. It raised a new and important question as to the extent of the doctrine of implied grant. It appears, from the report in the *Times*, that in 1863 the London, Chatham, and Dover Railway Company sold to Solomon Myers, the deceased plaintiff, a piece of land in Newington-causeway, on the south-west side of the railway (being part of the surplus lands of the company), and upon this land he built a house, where he resided until his death. The windows of the house faced the railway, which here ran over a series of brick arches from which the plaintiff's house was distant about 8 ft. The sale was carried into effect by a conveyance dated Dec. 31, 1863, which contained a recital to the effect that the company required all the land other than that sold to the plaintiff for the purpose of constructing their railway. It contained no express grant of a right to light. The plaintiff alleged that from 1863 he had enjoyed access of light to the windows of this house through the openings of two of the arches. In 1870 the defendant acquired from the railway company the fee of the land on each side of the two arches, and a lease for thirty years of the arches themselves. In November, 1887, the defendant erected buildings on the north-east side of the railway, a short distance from the openings of the arches, and in December, 1887, he blocked up with wooden hoardings the openings of the two arches on the side nearest the plaintiff's house. From 1872 the arches had been used for the storage of heavy machinery, which blocked out the greater portion of the light coming through the openings. The plaintiff brought an action to restrain the defendant from obstructing the light through the arches, and upon his death, in 1888, the action was continued by his widow. Mr. Justice Kekewich granted an injunction as to the hoarding, and directed an inquiry as to the damages occasioned by the erection of the buildings. (5 *Times* L. Rep., 658.) The defendant appealed.

Mr. Neville, Q.C., and Mr. Russell Roberts, for the appellant, contended that the recital in the conveyance of 1863 that the land retained was required for the purposes of the railway was inconsistent with the notion of an implied grant to the plaintiff of a right to light, and that the plaintiff was not entitled under the Prescription Act, by reason of the interruption of his enjoyment of the light in 1872.

Mr. Warmington, Q.C., and Mr. Swinfen Eady, for the respondent, upon waiving their right to the inquiry as to damages, were not called upon.

The Court dismissed the appeal.

Lord Justice Cotton, in delivering judgment, said that the question was whether there was any implied obligation on the part of the railway company not to obstruct the plaintiff's light. If the owner of two plots of land, on one of which a house was built, sold the plot with the house upon it, then there was an implied obligation, contract, or covenant on the part of the vendor not to interfere with the access to light over the portion which he sold. That was the law in the case of an ordinary landowner, but this was the case of a railway company, and it was said that it would not be presumed that a railway company would contract to do anything which might interfere with the construction of their railway, and that the whole of the land was stated to be required for that purpose. It was clear that the implied contract entered into by the railway company must be subject to this limitation—that they were not to be prevented from doing whatever was necessary for the purposes of constructing their railway. It was argued that this really made the obligation dependent upon the will of the railway company, and that that was inconsistent with the idea of an implied covenant. But that was not so. What was necessary for the construction of the railway was not a matter which depended entirely upon the will of the railway company. His Lordship therefore held that the railway company, as owners of the land which they sold to the plaintiff, entered into an implied obligation not to do anything on the land retained by them so as to interfere with the plaintiff's reasonable enjoyment of the land sold, except what was necessary for the construction of the railway. Then was the hoarding required for this purpose? Certainly not. The arches were leased, and the tenant had put up a hoarding for his own benefit. Even assuming that the hoarding was indirectly for the benefit of the railway company, it was not put up for the purpose of constructing the railway. His Lordship then discussed the evidence as to the extent to which the light was diminished, and agreed with the conclusions of the learned Judge below. Referring to the evidence of scientific witnesses, his Lordship observed that he desired to say nothing against scientific witnesses, but in his Lordship's judgment the evidence of witnesses who deposed to the facts was much more reliable. One knew how frequently scientific witnesses of great skill and ability were found by the light of subsequent events to be wrong in their conclusions. In his Lordship's opinion the appeal failed.

Lord Justice Bowen was of the same opinion.

Lord Justice Fry concurred.

* We take our report from the *Freeman's Journal*. If it be correct, the Council seem to take a rather sanguine view.—ED.

MASONS' SEALS.

SIR,—In the work by Messrs. Waller, "On Monumental Brasses," fol. 1842, &c., referring to a tomb to Sir John de Creke and Alyne his wife, at Westley Waterless, Cambridgeshire (dated about 1325), it is stated that "at the right foot of the lady's figure is a monogram," about 1 in. diameter, "consisting of the letter N, above which is a mallet, on one side a half moon, and on the other side a star or sun." "The same device is to be found on a seal attached to a deed 5 Edward I. (1276–77), wherein one Walter Dixi, cementarius de Bernewelle, is conveying certain lands to his son Lawrence; the seal has for its legend "S' Walter le Masun," with a hammer or mallet, a half moon, and star," as described by Godwin, in *Archæologia*, 1844, p. 119, derived from Coles's MSS., vol. viii.

Dingley's "History from Marble," 4to, 1868, vol. ii., on p. 155 gives a copy of an indenture for executing the monument in Bath Abbey Church to Bishop Montague, dated Nov. 25, 1618, "Between Sir Charles Montague, of London, Knight, and William Cuer, citizen and freemason of London, and Nycholas Johnson, of S. Saviour, Southwark, carver." Attached to it are two seals (given in woodcuts); that of Cuer's is lozenge-shaped, the other is two chevronels with a mullet. The names of the two witnesses are William Blagrove and Francis Legge. Neither of these coats-of-arms are attributable to any of the names. I do not find Cuer's in the "Armorials," but two chevronels occur in the coat of "Johnson of Leicestershire."

These are two instances, very far distant, of seals used by masons. Are any others known during the 350 years (1276 to 1618)? Under what circumstances had a "mason" a right or privilege (query) during the earlier years, perhaps, to use a seal? A "mark" we know was used, and we also know how many master masons' marks are still to be seen abroad on the buildings than in England. I am not now referring to the marks seen on the beds or faces of stones, attributed to the ordinary workman. I do not remember an example of a seal used by a master carpenter or any other tradesman, but the subject has not attracted my attention before the present instances.

WYATT PAPWORTH.

AN ILLEGALITY IN LONDON HOUSE DRAINAGE.

SIR,—The report of this case on pp. 428–29 of the last number of the *Builder* is interesting to all who have anything to do with drainage work. The statement by Mr. Curtis-Bennett that,—"It was most important for the well-being of this large metropolis that every house should have direct communication into the sewer" is quite right. By "house" is here meant, I suppose, a building or part of a block of buildings. It will also be understood, I expect, that each "house" will be trapped off from the sewer. In the case of a block of houses draining into a back-lane where there is no public sewer, it would hardly do, however, to ask each house to carry its drain separately down the lane to the street. In this case, for each house to have its drain, —6 in., say,—branched into a larger drain-pipe, but trapped off from said larger drain, would be sufficient. In fact, in a case like this, if desired, the main drain-pipe might itself be trapped off from the street sewer and ventilated *per se*. I did this in the case of an epidemic in 1879.

In the case of tenement houses, where, from one common entry, there are large houses to right and left on each flat, as is common in Glasgow, it may yet be found advisable to have the drains of the houses on the right hand kept quite distinct from the drains and soil-pipes of the house on the left hand, especially so far as preventing gases, &c., from the drains on one side of the tenement getting access to the drains or soil-pipes on the other side; isolation, as far as possible, being the watchword for safety.

W. P. BUCHAN.

Glasgow.

THE DISPOSAL OF OUR DEAD.

SIR,—The paragraph on page 417, referring to the Duke of Westminster's condemnation of overcrowded cemeteries, is of interest to all sanitarians. His Grace's recommendation of "earth-to-earth" burial is not, however, the real or final solution of the problem, but only a sort of half-way house. Science and modern sanitary requirements distinctly point to cremation as the most proper and safest mode of dealing with the dead, and especially for guarding against any chance of after-infection from the bodies of those who have died from infectious diseases—as so many do. On page 418 it is stated,* that if cremation were generally adopted, then, where there were numerous bodies to be disposed of daily, the air might probably be laden with particles of matter given off during the conflagration, and the question rises: "Which is the least injurious, to have such particles distributed in the air around us, or in the earth beneath us?"

Now as to this, owing to the way in which the body is consumed and the intense heat which anything from it has to pass through before it can reach the open air, there is no chance of any diseased particles ever passing through the furnace without being destroyed or having their capacity for producing disease stopped.

Were people to allow themselves to fully realise the exceeding loathsomeness of the human body some weeks after death—a mass of putrid flesh with millions of low animalculæ preying upon it—they would cry out for cremation to save their dead from such pollution. As it is, both science and sanitation are educating the public mind on the subject, and crematories have been lately erected in many places. The movement has spread to Scotland, and at Glasgow the Scottish Burial Reform and Cremation Society is now being constituted for the purpose, *inter alia*, of erecting a crematory where not merely the bodies of the rich may be sanitarily disposed of quickly, but even those of the poorest.

"Cleanliness is next to godliness" might well serve as a motto for the cremationists. There is no reasonable cause why any educated Christian should object to cremation. The body must pay its debt to Nature, and it is better to do so in two hours, so as to prevent after-evil, than to preserve it for years to perchance produce an epidemic and so give cause for our descendants to curse the stupidity of their ancestors.

A CREMATIONIST.

* It was not "stated"; only suggested as a possibility. – ED.

FRENCH BUILDING TERMS IN MASONRY.

SIR,—In your notice in last week's *Builder* of a recently-published Technological Dictionary, English-German-French, you allude to the words "moëllon" and "pierre de taille" being indiscriminately translated in the French Dictionaries.

I have worked for many years in France, and the architects I consulted on the point all translated "pierre de taille" "ashlar."

"Moëllon" is the stone used in wallers' work.

Such stones, for example, as "Touris or Cassis Pierre de taille *dure*," are often specified "Moëllons piqués à la pointe et entouré d'une *ciselure*" (drafted edges), but I never knew freestones as "Arles, Echaillon," so termed, otherwise than "Pierre de taille," a distinction being made between the "Pierre de taille *dure*," and the "Pierre de taille *tendre*," by the addition of the words I have put in italics.

Quoting from a copy I made some years ago of a "Cahier des charges relatif au projet de construction du Sémaphore de Faraman conformément aux ordres du Ministre de la Marine et des Colonies en date du 15 Mars, 1881." Article 29 of the "Devis Technique," descriptive of the "Maçonnerie de pierre de taille," the word "moëllon" is not once used. It runs thus, "La maçonnerie de pierre de taille sera faite par assises règlées, les *pierres* seront posées avec soin," &c.

In the article immediately preceding the above, referring to the wallers' work, it commences, "Dans les maçonneries de moëllons, les assises seront conduites de niveau avec celles de la pierre de taille."

Take another precedent, being a copy of a "Cahier des charges pour l'entreprise des travaux pour l'agrandissement de l'arsenal d'artillerie de terre à exécuter conformément aux ordres du Ministre de la Guerre en date du 2 Décembre, 1882." It reads, "La maçonnerie de *pierres de*

taille sera faite," &c., the word "moëllon" not once occurring.

In Tolhausen's "Technological Dictionary (English-German-French)," the word "ashlar" is translated "pierre-de-taille," "moëllon" is not mentioned, but in the French-German-English part of the same work "moëllon" is translated "ashlar" (!).

"Pierre de taille tendre ou dure (as the case may be) en paremens vus" is the best and clearest translation I know of for ashlar, say to the front of a building, and for any kind of wallers' work, "Maçonnerie en moëllons" describing the nature of work required, and, if the face of the moëllons is exposed to view, add a "plus value pour paremens vus," stating if "à la bouchardé," or otherwise.

"Dégauchis" is more generally used than the word "ebouziné" (if applied to moëllon, "ebouziné"; if applied to pierre, "ebouzinée").

J. Gilling, C.W.

AN OLD LONDON HOUSE.

Sir,—At the back of St. Mary-le-Bow there is an old house, seventeenth-century dated. I could not make out the whole date except "16." A square block of stone is let into the wall, with a numeral at each corner, and antique head in centre. The house is closed, and I regretted to notice, from a board in front, that it is to be taken down. Possibly there may be something remaining of interest inside, such as staircase, cupboards, chimney-pieces, &c.

H. R. B.

The Student's Column.

WATER-SUPPLY.—XXV.

WATER-RAISING.

IN the water-supply to large houses, mansions, and such buildings as are used for schools, breweries, asylums, prisons, and various other institutions, away in the country far from towns whose existing water-supply is not available, it is advisable to consider whether such natural means as are at hand may not be adapted to the exigencies of the case and utilised either for the purposes of supply or as a means of power.

If the building which is proposed to be supplied with water is in a hilly district some stream may, by a small dam in the upper part, be converted into a reservoir, and this collected water brought down by gravitation through pipes to the building, and then filtered and used directly; or the stream may perhaps, if the head of water is sufficient or the current fast enough, be more advantageously used as a source of power, whereby other and purer water may be raised from a lower level of supply and distributed from a service reservoir by pipes wherever required.

The machines by which power is extracted from flowing water are hydraulic pressure engines, turbines, rams, and water-wheels.

The whole of the theoretical mechanical effect from flowing water is never obtained in practice, as by loss through friction and after acting on and passing through the machine the water still retains some velocity, and this velocity is, of course, so much power lost. The theoretical horse-power or efficiency of water equals $\frac{62{\cdot}5\ Q.\ h.}{33{,}000}$ or ·001893 Q. h., where Q. equals the quantity of water in cube feet per minute, and H. equals the head of water. Now, it is found by experience that, taking the theoretical horse-power as 1·00, the efficiency of the various water-motors, according to Molesworth, differs from this as follows:—

Water-pressure engine	·80
Turbine	·70
Overshot water-wheel	·68
Hydraulic ram	·60
Breast water-wheel	·55
Undershot water-wheel	·35

It will be seen from the above that a water-pressure engine is by far the most efficient machine, and where a good head of water is available, and the quantity used no object, it does very well; but, unless natural circumstances are favourable, the expense for water is very great. The water-pressure engines generally used are like small steam-engines, and for each revolution of the crank-shaft two complete cylinders full of water must be used, whether the power is wanted or not, as there can be no saving by expansion in the cylinder, as in the case of steam and compressed air-engines.

The hydraulic ram, invented by Montgolfier, is a very useful machine for raising water, and a great number are in use for supplying houses and their surrounding buildings; the principle upon which they act is that the inertia of a large quantity of water with a small head, suddenly checked, will transmit its energy to a small quantity of water and force it to a greater height. Almost everybody is familiar with the violent shock and rattle in the water-pipes of a high building when a tap which has been running for some time is suddenly turned off. This shock is due to the energy of the inertia of the running water being pent up behind the tap, and if the head of water is considerable will burst the pipes. So much damage has been done by this means to pipes that the water companies have almost universally adopted screw-down taps, in order to insure that the water should be turned off gradually. In the hydraulic ram this shock is the power, and the usual arrangement of the machine is as follows:—Sufficient head of water having been obtained, the water is conveyed by a very strong injection or drive pipe to the machine, which consists of a compression-chamber and air-vessel, with a large valve at the outlet end and a smaller pipe on the top with a check-valve to prevent the return flow of the water which has been forced up. The large valve at the outlet end, or "pulse"-valve as it is called, is a hinged flap opening towards the head of water, and so balanced that when the water is at rest, the balance-weight raises the flap. The water from the drive-pipe runs freely through the machine and pulse-valve until its velocity is sufficient to overcome the balance-weight of the pulse-valve, which it closes violently, and the inertia of the pent-up running water then opens the check-valve on the top of the chamber, and finds relief in ejecting part of itself into the air-vessel and rising main; the water being now at rest again, the check-valve closes, and, the balance-weight falling, opens the pulse-valve and allows the same series of events to occur again.

It will be seen that the hydraulic ram, as described above, simply forces up a portion of its own supply of water, whether pure or impure, to a greater height; but the machine may easily be so modified that it can be worked with impure water to pump up pure water, and this is effected by causing the energy of the pent-up water, when the pulse-valve is closed, to act upon a piston instead of on the check-valve, and so pump up a supply of pure water. This form of hydraulic ram is not recommended, as in a short time the piston wears, and the pure water is mixed with the impure. Very large hydraulic rams are not to be commended; two smaller ones are better, and have the advantage that if one breaks down the other can still work; and, furthermore, if a scarcity of water happens during a dry season, there may still be enough water to work a small ram, when a larger one would be quite useless.

In calculating the quantity of water required to work a ram, it may be assumed that one-seventh of the water may be raised about four times the height of the head; one-half that quantity eight times the head, and so on. The length of the drive- or induction-pipe should on no account be less than three-fourths of the height to which the water is to be raised, or the reaction on the closing of the pulse-valve will take place at the commencement of the drive-pipe instead of in the compression chamber.

Turbines are hydraulic machines whose power is derived from the reaction of water escaping from openings placed in the same direction at an angle around an axis, and this action consequently causes a couple moment around that axis. The simplest form of turbine is the ancient hydraulic tourniquet.

In practice, turbines consist of a circular series of fixed guide-plates so curved that the water, in passing through them, impinges at right angles on another circular series of curved plates called buckets attached to a central movable axis, or to the inside of a revolving drum.

In Jonval's turbine the guides and buckets are superimposed, and the water flows from the head into a bowl-shaped receptacle, at the bottom of which are fixed the guides, and immediately under them the buckets, attached to a spindle-shaped axis to avoid dead water. In passing through, the water is deflected upon the buckets at right angles, and causes them to revolve. The buckets and guides are so designed that the water, after passing through, has little or no rotary motion left.

In Fourneyron's high-pressure turbine the guides and buckets are in the same plane, and the water flowing from the centre is spirally deflected by the guides outwards to their periphery, where it impinges at right angles against the buckets disposed in an annular ring around them, and attached by arms to a vertical axis, which it thus causes to revolve.

A third form of turbine is also made; it is something similar to Fourneyron's, the guides and buckets being in the same plane; but it differs from that in the fact that the water flows from the outside to the inside, the guides being fixed to the outside drum, and the buckets to the axis.

It can readily be understood that turbines can be constructed of all sizes and powers, but the principle in all is the same. Where they have been applied to pumping purposes, they are generally found to be most economical. They are usually geared from the vertical axis horizontally to the pumps.

The water-wheel is another simple hydraulic machine extensively used to utilise the power stored up in running water. Water-wheels are of two kinds,—overshot and undershot. In the overshot wheel the water is conveyed by a shoot to the top of a wheel moving in a vertical plane, provided with buckets at the periphery. The water flowing from the shoot at the top and filling the buckets, by its weight causes the wheel to revolve, the buckets emptying themselves as they get lower down.

In undershot wheels, in which are included breast wheels, the current of water is directed against similar buckets from the underside and rear of the wheel, and the power is derived from the velocity of the current.

A very much superior kind of undershot-wheel is that of Poncelet. In this a dam is placed behind the wheel, and the water kept at a head, being only allowed to act on the buckets of the wheels through a sluice at the bottom, whose greatest opening should not exceed one-eighth of the head.

Fairbairn, finding that the stream of water did not fill the buckets, invented a ventilating bucket called after him, in which the air escaped at the back as the bucket filled.

All these kinds of wheels have been applied to give power for pumping purposes, and generally give satisfactory results.

The only mechanical power we have from nature ready to our hands besides that of running water is the wind, and the only form in which this is utilised to raise water is by windmills, machines whose power is derived from the velocity of the air acting on inclined sails attached to a wheel. Despite the proverbial uncertainty of the wind this source of power is extensively used in exposed places to pump water for large houses, factories, &c.; but it will be readily understood that the pumping power and the service-reservoir must be capable of holding many times the daily quantity required. Windmills for this purpose are more used in the colonies and in the United States than at home, but there are still many working in England. The simplest construction of these is as follows:—A timber stage or scaffold is erected sufficiently high to fully expose the sails to the action of the wind, and a crank being made in the axle of the revolving sail-wheel imparts motion to a connecting rod attached to the piston-rod of the pump below. Larger windmills drive a vertical shaft, geared to a pinion on the axle of the sail-wheel. English mills usually have canvas sails. Colonial ones more usually wooden or iron laths. As examples of the use of windmills for water-raising, at Folkestone station a mill, as described, has been pumping water for many years past, and in the Scilly Islands a mill was used a few years ago to supply water for the use of the Trinity House light-keepers.

Association of Municipal and Sanitary Engineers and Surveyors.—The Council of this Association have awarded a premium of 10*l.* to Mr. E. J. Silcock, A.M.Inst.C.E., Borough Engineer, King's Lynn, for his paper on "Electric Lighting," read at the annual meeting of the Association held at Portsmouth. A premium of 5*l.* has been also awarded by the same body to Mr. A. E. White, A.M.I.C.E., Borough Engineer, Hull, for his paper on "Municipal Engineering in Hull."

New Water Supply for San Francisco.—A proposal is under consideration in San Francisco for supplying the city with water direct from lakes in the Sierras.

VARIORUM.

"HAZELL'S ANNUAL FOR 1890" (London: Hazell, Watson, & Viney) is the fifth issue of that compilation, and, like its predecessors, it will be found very useful. But we regret to see that the Editor has not supplied one or two important omissions to which we directed attention last year. We are told on the title-page that the work contains "above 3,500 concise and explanatory articles on every topic of current political, social, biographical, and general interest referred to by the Press and in daily conversation." Perhaps it is because the Press and the public take so little interest in architecture that the Editor thinks he can still afford to exclude all mention of the Royal Institute of British Architects,—the chartered and only really representative body of an important profession. Notwithstanding the importance of the Examinations of that body in reference to the public welfare, and, despite the fact that for certain examinations the Institute is the statutory examining body, the Editor of the "Annual" takes his cue from the daily papers, and ignores architecture and the architectural profession, to say nothing of builders and District Surveyors. Nor is the work free from errors. To cite one example. In the "Obituary" of the year mention is made of the death of Mr. Norman Bazalgette, who is described as "past President of the Institution of Civil Engineers." As a matter of fact, Mr. Norman Bazalgette was a barrister. The compiler has evidently confounded Mr. Norman Bazalgette with Sir Joseph Bazalgette; Sir Joseph *has* been President of the Institution of Civil Engineers, and, happily, he is still living.——"The Money, Weights, and Measures of the Chief Commercial Nations in the World, with the British Equivalents," by W. A. Browne, M.A., LL.D. (London: Edward Stanford), is a very handy little book, which is now in its seventh edition. In the preface to this edition the author informs his readers that the work has been revised and corrected up to date, as far as possible, and that, "owing to changes in the currencies, and denominations of moneys of account and exchange, and to the introduction of the metric system of weights and measures in several countries, it has been necessary to make many alterations, and several articles in the present edition have been re-written." The author appears to have done his work very thoroughly, and incidentally gives a great deal of information about "things not generally known" in connexion with the coinage of the world.——"Shorthose's Commercial Ready Reckoner" (London: Bemrose & Sons) is now in its fourth edition. It is principally designed for the use of merchants and others transacting business in heavy goods, and gives the sum of weights ranging from a quarter of a hundredweight to 50 tons, at prices ranging between a 1d. and £2. 10s. per ton inclusive. It is clearly printed and arranged, and random checkings here and there have shown it to be accurate.——The Christmas Number of the "Publishers' Circular" (London: Sampson Low & Co.) is partially devoted to reviews of new books deemed suitable for Christmas and New Year's gifts, and contains a great many illustrations. The reviews and illustrations are printed on specially-prepared paper.

ALMANACKS AND DIARIES FOR 1890.

"THE British Almanac and Companion" for 1890 (London: The Stationers' Company) embodies a great deal of useful information in a very compact form, and is clearly printed and arranged. It gives a list of the Acts of Parliament passed during the last session, with abstracts of the more important ones, and a list of the County Councils, with the notable exception of that of London, which seems to have been forgotten altogether. The article on "Architecture in 1888-89" is signed by Mr. R. Langton Cole, and is a tolerably full and accurate record of the building work of the year. It contains nothing worthy of particular remark, however, if we except the fact that Mr. Collcutt's name is inaccurately spelt at least twice. The article on "The Art of the Year" is by Mr. Cosmo Monkhouse, and the article on "The Science of the Year" by Mr. E. W. Maunder.

The "Law Almanack" for 1890 (published by Thomas Scott & Co., Warwick-court, Holborn) is a very useful and well-printed sheet-almanack, mounted on cardboard for hanging up.

"Calvert's Mechanics' Almanack and Workshop Companion" for 1890 (London and Manchester: John Heywood) is, as heretofore, a useful compilation for artisans and handicraftsmen, now in its seventeenth year of publication.

Messrs. Hudson & Kearns, of 38, Southwark-street, send us a parcel of their admirable diaries, specially adapted to the requirements of architects, surveyors, engineers, and builders. The present issue is fully up to the standard of excellence and completeness attained in former years. A special feature of the larger editions of the series is that each separate volumne may be said to comprise within itself a complete set of account-books, paged and provided with an index, so that it will be the owner's own fault if he cannot make immediate reference to the record of any particular transaction. "The Architect's Diary," No. 12, is one of this series. It contains one page to a day, besides index, note-book, rent and insurance register, cash-book, ledger, summary of cash transactions for the whole year; also cases tried in the Superior Courts of Justice during the legal year from November, 1888, to August, 1889, of interest to the profession; a complete list of District Surveyors and districts, with official and private addresses, regulations of the London County Council applying to music, dancing, theatre, and other licences; and much special matter referring to the various architectural and engineering associations. It includes also an alphabetical index to the practical statutes and various items relating to the professional practice of architects, stamp duties, &c. "The Architect's Diary," No. 13, is similar to this, but bulkier, having two pages to a day. The "Builder's Diary," No. 11, is arranged on a similarly comprehensive plan, with a certain variation in the contents to suit the requirements of builders. No. 9 is a diary for general use by others than architects, builders, and engineers. Messrs. Hudson & Kearns also send us an assortment of their excellent date-indicating blotting-pads and desk diaries combined, which have many conveniences.

"The Architects', Surveyors', and Auctioneers' Diary and Almanac for 1890," published by Waterlow Bros. & Layton, Limited, 24, Birchin-lane, is a very well-printed and arranged diary for professional men. Besides the usual information contained in such works, it gives lists of the Fellows and Associates of the Royal Institute of British Architects and the Surveyors' Institution, and lists of the Members and Associates of the Institution of Civil Engineers and other societies. It also contains a list of District Surveyors and their offices, the text of the Metropolitan Building and Management Acts and By-laws, and a great deal of other useful information.

"Lamb's Builders' and Contractors' Diary for 1890," published by Alexander Lamb, Devonshire-chambers, Bishopsgate-street, purports to be the seventeenth annual issue of that publication, although we do not remember to have seen it before. Under the head of "Buyers' Guide," we find, curiously enough, a list of architects, but upon what principle the names have been selected we are not told. The names given comprise those of a few eminent architects, together with a majority of comparatively unknown men. Some of the most eminent architects' names are omitted,—Mr. Aitchison and Mr. Waterhouse, for instance. Nothing like the number of architects mentioned in the R.I.B.A. list of members, or in the Post Office London Directory, are given. And we are at a loss to know why some of the names in this meagre list are printed in full capitals. The foregoing remarks and queries apply to most of the other headings under the "Buyers' Guide," which all through appears to be a most partial and unfair compilation. Whether this is intentional, or merely the result of want of knowledge on the part of the compilers, we are unable to say. To quote one instance out of many which we could give in illustration of what we mean. Under the head of "Water-closet Manufacturers," only two names are given, viz., "Brazier & Son," and, "J. Tylor & Sons." The compiler has apparently never heard the names of Jennings, Doulton, and other well-known manufacturers of the appliances. Under the circumstances, we cannot recommend this diary to our readers.

New Theatre in Vienna.—A new theatre, upon the model of the Paris Eden Theatre, is to be erected in Vienna, capable of holding 3,000 persons.

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

18,606, Bath Waste Fittings. D. Howarth.

According to this invention, a loose lid and basin-trap is fixed to waste-pipes from baths, lavatories, &c., to prevent the passage of sewer gas or foul air from the drains. The arrangement forms a kind of double socket, which acts as a water seal and yet being loose it is very easy to clean and adjust.

430, Venetian Blinds. A. Smith.

The improvements which are the subject of this patent enable the blind to be removed bodily from the window opening, and to be replaced when required without dismantling the blind. The fixed head or pulley lath is dispensed with, and the pulleys are so mounted in the brackets as to be readily removable and permit the removal of the tapes and cords.

638. Valves for water-closets. G. Jennings.

The improvements which are the subject of this patent consist mainly in the combination of a regulating diaphragm with the main valve, so arranged that whilst the main valve is opening the water is able to pass the diaphragm freely, but when it is closed the water can only pass slowly by a regulated orifice. The valve seats are of vulcanite, and various mechanical arrangements are described which effect improvements in the control of the flow of water.

977. Portable Scaffold. J. Harper.

This invention consists of an upright framing of corner-posts constructed in lengths, and erected on a wheeled base or platform. Racks and guides are fixed upon the posts, which enable a cage to be moved up or down by means of wheel and pinion or similar gear. The cog-wheels are joined by pairs of bolts engaging with a hand-lever when required.

1,240, Motive-power Mortising Machines. E. Cory and Others.

Several mechanical arrangements, designed to effect an improvement in this class of machines, are described at length in the specification. A belt works over reciprocating pulleys carrying the chisel-head of a mortising machine and a counterbalance weight for the purpose of giving a reciprocal motion to the chisel-head, whilst, at the same time, the head can be brought down towards and retired from the work. Two other important features are a compound lever for actuating and steadying the chisel, and a guard for the same when it is thrown up out of work.

3,310, Window Frames and Sashes. J. Young.

Many details are enumerated in the specification, among them—(1) The sash-stiles and dovetail "keeps" by which the sashes are held together to form weathertight joints at the shutting side of the casement in all states of the wood; (2) Flush bolts by which the sashes and hanging pieces are locked together when the sashes are not intended to open into the room; (3) Automatic stops to hanging pieces; and (4) The attachment of the balance-weight cords to the hanging pieces in such a way as to allow of their being connected or disconnected without disturbing the staff or parting-beads.

NEW APPLICATIONS FOR PATENTS.

Dec 2.—19,302, R. Little, Mortising Chisel.—19,305, J. Turnpenny, Water Waste-preventer and Flushing-tank.—19,308, D. Law and others, Water-closets.—19,312, J. Whitehouse, Brick Kilns, &c.—19,341, R. Pulton, jun., Paint-cans.—19,343, G. Bischof, White Lead.—19,345, McGuire Slane, Hinges.

Dec. 3.—19,368, H. Horn and J. Effinger, Combined Rule and Protractor.—19,375, J. Cooke, Composition for Floors, &c. — 19,393, W. Davis, Enamelled Cork Tiles.—19,399, J. Scholes, Draught-excluders for Doors.—19,427 and 19,442, E. Winchester, Door Latches.

Dec. 4.—19,461, W. Franklin, Stench-trap.—19,468, S. Bott, Sash-fasteners.—19,481, M. Moore, Chimney-cowls, &c.—19,483, J. Robbins, Applying Disinfecting Water-closets, &c. — 19,500, J. Hamblin, Fireplace and Stoves.

Dec. 5.—19,511, J. Crane and W. Windle, Bench-plane.—19,524, S. Empsall and W. Fish, Self-acting Syphon Flusher for Water-closets, &c.—19,541, A. Palmer, Flooring of Bridges, Warehouses, &c.—19,575, S. Burgess, Sash Windows.—19,586, C. Smith, Imitation Marble, Stone and Mosaic.

Dec. 6.—19,604, J. Palmer, Plastic Wall and Ceiling Covering Composition in ornamental relief.—19,616, M. Wardle, Hanging and Re-hanging Window-sashes.—19,617, M. Wardle, Self-acting Window-wedges.—19,627, T. and J. Mann, Kitchen-ranges.—19,634, W. and M. Gray, Ventilators.—19,664, W. Scott Mouerieff, Urinals.

Dec. 7.—19,699.—W. Cook, Baker's Oven.—19,724, H. Aland, Rotary Fans for ventilating, &c.

PROVISIONAL SPECIFICATIONS ACCEPTED.

15,419, G. Walker, Air-tight Door or Cover for Drains, &c.—15,585, J. Easby, Automatic Appara-

tus for Water Closets, &c.—16,015, E. Johnson, Paving Blocks.—16,831, W. Cowan, Flushing Cisterns.—17,146. J. Mattison, Window Sash Frame.—17,192, H. Board, Roofs and Sides of Buildings, especially Horticultural.—17,442 J. Hamblet and A. Plant, Flooring Tiles, &c.—17,443, W. Lindsay, Tiles, &c.—17705, J. Braidwood and J. Johnston, Fire Proof Construction.—17,706 The Millars' Patent Reversible Window Co., and H. Millar, Holding or Securing Reversible Window Frames.—17,752, T. Collins, Hanging Iron for Ladders.—17,908 S. Warr, Ornamental Bricks or Mouldings, &c.—18,806 J. Empson and J. Hewitt, Syphon Flushing Cistern.—18,098 C. Hickton and J. Clevely, Catch for Cupboard Doors, &c.—18,125, W. Newman, Sash and Window Fasteners.—18,154 W. Luther, Sheet Metal Astragals and Sash Bars.—18,474, G. Arnold, Sanitary Flushing Apparatus.—18,586, H. Grefen, Door Locks.—18,589, J. Millard, Process of Backing Silver Glass.—18,789, R. Webb, Sash Fasteners.—18,809, J. Kaye, Securing Latch Handles and Knobs to Doors.—18,951, W. Hague, Kilns.—19,092, W. Akerman, Boilers for Utilising the Waste Heat of Kilns.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to Opposition for Two Months.

974, J. Gilmore and W. Clark, Locks and Fastenings.—1,578, R. Stone, Paint, &c.—2,023, J. Johnson, Rain Water down Spouts.—2,121, G. Wright, Block, Tile, or Slab for building purposes. 4,638, F. Lake, Sawing Machinery.—5,073, G. Wallis, Ventilation and Flushing of Sewers.—5,139, A. Ragg, Carpenter's Planes.—7,318, W. Vyse, Slow Combustion Stoves.—12,333, E. Kerry, Heating Greenhouses.—12,829, J. Metham, Joiners' Clamp.—16,819, J. Sherwin, Opening and Shutting Gear for Greenhouses.—17,032, H. Lake, Portable Scaffolds.—17,335, F. Nickel, Support for Scaffolding.

RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

Nov. 19.—By Walton & Lee (at Manchester).

Manchester, near to—"The Astley Estate," comprising 1,365a. 1r. 13p., f.	£90,000

Dec. 9.—By R. H. Evans.

Barnsbury—88 and 90, Wynford, u.t. 56 yrs., g.r. £6. 10s., r. £80 p.a.	655

By Weatherall & Green.

Bermondsey—33, Bermondsey-wall, f., including mortgage	3,893
Tottenham—3 and 4, Keston-villas, u.t. 91 yrs., g.r. £6. 6s., including mortgage	613

By Percival Hodson.

Holloway—40, Landseer-rd., u.t. 68 yrs., g.r. £6. 6s., r. £30 p.a.	235

Dec. 10.—By J. P. Lash.

Kentish Town—32, Ashdown-st., u.t. 77 yrs., g.r. £7, r. £33 p.a.	230
11, Raglan-pl., u.t. 35 yrs., g.r. £5, r. £32. 10s. p.a.	175
Limehouse—1 to 4, Goodwin's Cottages, u.t. 31 yrs., g.r. £18, r. £61. 3s. p.a.	50

By Frank Jolly & Co.

Bromley-by-Bow—31 to 37, Franklin-st., u.t. 63 yrs., g.r. £32, r. £171. 12s.	830
Leytonstone—1, "Lansdowne Villas," u.t. 81 yrs., g.r. £5, r. £21 p.a.	305
Mile End—1, Pk.-rd., u.t. 63 yrs., g.r. £11. 3s. 6d., r. £132 p.a.	1,000
63, 65, 67, and 69, Redman's-rd., u.t. 32 yrs., g.r. £10, r. £122. 4s. p.a.	435
49 and 50, St. Peter's-rd., u.t. 41 yrs., g.r. £6. 16s., r. £76 p.a.	640
34, Carlton-rd., u.t. 34 yrs., g.r. £3, r. £22 p.a.	230
35, Carlton-rd., u.t. 36 yrs., g.r. £3. 3s., r. £26 p.a.	230

By Marrett & Rogers.

Somers Town—17 to 22, Sidney-st., and 64 and 66, Aldenham-st., g.r. £38, r. £224	1,650

By Chinnock, Galsworthy, & Co. (at Selby).

Selby, near.—Brickyard Farm, 39a. 3r. 21p., f., r. £29 p.a.	750
F. farm, 90a. 2r. 11p., r. £158. 18s. p.a.	3,500
F. farm, 249a., r. £198. 1s. 4d. p.a.	4,360

Dec. 11.—By Grogan & Boyd.

Mayfair—67, Curzon-st., u.t. 832 yrs., g.r. £1	6,800

By H. Griffin.

Battersea—F.g.r. of £6, with reversion in 61 yrs.	151
F.g.r. of £10, with reversion in 62 yrs.	245
F.g.r. of £40, with reversion in 63 yrs.	1,180
F.g.r. of £3, with reversion in 59 yrs.	83
Camberwell—l.g.r. of £44. 12s. 6d., u.t. 72 yrs., g.r. £34. 10s. p.a.	150

Dec. 12.—By Boyce & Eyers.

City—The lease and goodwill of 3, Addle-st., u.t. 25 yrs., r. £235	600

By Dowsett & Co.

Stoke Newington—85, Albion-rd., f.	400

By Glasier & Sons.

Notting-hill—223, Cornwall-rd., u.t. 73 yrs., g.r. £8. 10s., r. £50	280
Lewisham—17, 19, and 21, High-st., u.t. 72 yrs., g.r. £24, 16s., r. £144	1,050

By Newbon & Harding.

Dalston—38, Wilton-rd., u.t. 63 yrs., g.r. £6, r. £32	£275
Camberwell—17, Brunswick-sq., u.t. 52 yrs., g.r. £12. 10s.	400
Highbury—110, 112, 116, and 118, Highbury-hill, u.t. 88 yrs., g.r. £18s. 18s., r. £162	1,375
120, 122, 124, and 128, Highbury-hill, u.t. 88 yrs., g.r. £18, r. £162	1,265
130, 132, 140, and 142, Highbury-hill, u.t. 88 yrs., g.r. £18, r. £161	1,350

By C. C. & T. Moore.

Shadwell—237, High-st., c., r. £31 p.a.	220
Commercial-rd., 47 to 53 (odd), Star-st., u.t. 11 yrs., g.r. £10, r. £95	125
"The Star of the East," f. beerhouse, r. £90 p.a.	2,180
No. 799, Commercial-rd., f., r. £100 p.a.	2,000

By E. Stimson.

Walworth-rd.—No. 205, f., r. £65 p.a.	800
Bermondsey—447, 449, and 451, Southwark-pk.-rd., u.t. 53 yrs., g.r. £15	800
Peckham—155 to 165 (odd), Queen's-rd., u.t. 32 yrs., g.r. £30	1,160
148 to 152 (even), Queen's-rd., u.t. 33 yrs., g.r. £12	670
Hammersmith—81 and 83, Sulgrave-rd., u.t. 86 yrs., g.r. £14	410
Wandsworth—37, 41 to 53 (odd), Pascal-st., u.t. 19 yrs., g.r. £40	260
Kensington—42, Sancroft-st., subject to a life aged 56 yrs.	85
Lambeth—4 to 7, Philadelphia-ter., u.t. 13 yrs., g.r. £20	370
Borough—8, 9, and 10, Mermaid-court, u.t. 21 yrs., g.r. £21	500
Camberwell—107, 109, 111, Neate-st., u.t., 14 yrs., g.r. £6	210
134 to 142 (even) Neate-st., u.t. 14 yrs., g.r. £10	350

Dec. 13.—By F. A. Carew.

Camden-town—1, Hawley-cres., u.t. 40 yrs., g.r. £5	225

By Eastman Bros.

Sydenham—2 and 3, Elderton-pl., u.t. 78 yrs., g.r. £18	100

[*Contractions used in this list.*—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g.r. for ground-rent; r. for rent; f. for freehold; c. for copyhold; l. for leasehold; e.r. for estimated rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; yd. for yard, &c.]

Miscellanea.

Liverpool Engineering Society.—The sixth ordinary meeting of this society took place on Wednesday evening, the 11th inst., at the Royal Institution, Colquitt-street. Mr. Henry H. West, M.Inst.C.E., took the chair; and there was a large attendance of members. After the customary routine business had been disposed of, Mr. Edward T. Ward, Assoc.M.Inst. C.E., read a paper on "The Salt Industries of Cheshire." He gave a concise and clear account of the geological position and probable formation of the salt-beds, and then passed on to review the history of the "working," "winning," and "getting" of salt from the earliest historical times, in its two forms as brine and rock salt. A vivid description of the method of mining the rock-salt and bringing it to the surface was given by the speaker, who also supplied a sketch of the manufacture of "white salt" from brine, especially with respect to methods of purification. The construction of salt-pans, with their furnaces, flues, and stoves, was then described in detail, and Mr. Ward referred to the subsidences consequent upon the pumping of brine and the mining of rock-salt, and in his concluding observations he gave an account of the present state of the trade under the Salt Union, on which he commented in favourable terms. An interesting discussion followed, and a vote of thanks was tendered to Mr. Ward for his paper.

The "Daily Graphic."—The formal opening of the building in which the *Daily Graphic* is to be produced took place on Wednesday evening, all the machinery being kept in motion so as to enable the visitors to see that business is to be done in earnest and on a good scale. The printers' composing-room and the foundry are at the top of the building called Milford House, in Milford-lane, Strand. Illustrated papers usually come from the Strand neighbourhood, as ordinary dailies from the district east of the Griffin. Machine-pits, 24 ft. long and proportionately wide, take up a good deal of space—even in a building over 100 ft. long—so Messrs. J. & S. Flint Clarkson, the architects, have put the engines in the basement, and large Babcock & Wilcox water-tube boilers on the floor above. The total outlay has been about £20,000. When all the large machines are at work from separate stereo- and electrotypes, 50,000 finished copies of the paper will be turned out in an hour.

India.—The Kurram bridge, which was formally opened by the Viceroy when he was on tour lately, forms part of the frontier road from Dera Ismail Khan to Khushalgarh, 202 miles long. Running parallel to the frontier boundary, it commands several of the most important passes into Afghanistan. It connects two systems of railways, bringing in touch the important military bases, Rawal Pindi and Mooltan, and linking together the Cantonments of Kohat, Edwardesabad, and Dera Ismail Khan. The old track or road, which was practically impassable in parts for wheeled traffic, has now been supplanted by what is designated a first-class military road, with easy gradients, and bridged and metalled throughout—many of the numerous bridges on it being fine specimens of engineering work. The road has been completed in about three and a-half years under difficulties inseparable from work on the frontier. The importance of the bridge can be imagined from the fact that regiments have been, at times, encamped for a week on the river banks unable to cross.——The work on the Chenab Bridge is getting on fast, and all employed on it appear to be determined to have the bridge ready by Jan. 1 next, in time—it is said—to be opened by our future King. Ten spans of the bridge are complete, or all but complete. The other seven spans, including the Muzuffergurh side abutment, remains to be done. Staging is being erected on some of these too, and so we shall probably have the bridge ready as promised. Every possible precaution has been taken to avoid the fate of the Victoria Bridge over the Jhelum at Drakinnam, when a fire was caused by a red-hot rivet falling on the sleeper staging below, which caused one—and that nearly the last—of the girders to curl up and delay the bridge-opening for two or three months, till a new girder was obtained from England.—*Indian Engineer.*

The Ruins of Troy.—The Vienna correspondent of the *Daily News* telegraphs:—"Some time ago Captain Boetticher, in his work 'La Troie de Schliemann une Nécropole à Incinération,' and in several essays and pamphlets, attempted to show that the ruins of Hissarlik were nothing but a prehistoric burying-place of the cremated dead. He asserted that Drs. Schliemann and Dörpfeld, to prove their theories on these excavations, pulled down certain walls, and thereby extended the single rooms. Dr. Schliemann thereupon went to Hissarlik with a German and an Austrian expert, Major Steffen and the architect Herr Niemann, who have publicly given their opinion that Captain Boetticher's assertions are untenable. They also say that he has withdrawn them after inspecting the ruins, and that Drs. Schliemann and Dörpfeld most certainly did not manufacture any evidence in favour of their theories."

The Blackwall Tunnel.—The *Daily Chronicle* says that the report of Mr. Wolfe Barry, who was appointed by the London County Council specially to go into and report upon the proposal to construct a tunnel from East Greenwich to Blackwall, is now before the Bridges Committee of the Council, to which committee six additional members have been added, in view of the importance of the matter to be discussed. Mr. Barry's report is exceedingly comprehensive, and he points out the difficulties in the way of the proposed construction. These are so tremendous that it is very likely the scheme will not be carried out in anything like the form originally agreed upon.

The St. Paul's Reredos Case.—The judgment of the Court of Queen's Bench, granting a *mandamus* to compel the Bishop of London to entertain the "representation" made to him on the subject of the reredos, and to deal with it as the Act directs, has been reversed by the Court of Appeal, Lord Esher, Lord Justice Lindley, and Lord Justice Lopes being unanimously of opinion that the court had no power to review the reasons given by the bishop for not allowing proceedings to be taken.

The late Herr Krupp.—The legacy of one million marks left by the late Herr Krupp to the town of Essen has been disposed of, it having been decided to expend it in erecting improved artisans' dwellings. Each house is to afford accommodation for two families.

The Danish Cement Industry.—A cement factory, the Aalborg Portland Cement Factory,—the first of its kind in Denmark,—has been established, with a capital of 45,000*l.*

Wind Force.—The usual monthly meeting of the Royal Meteorological Society was held on Wednesday evening, the 18th inst., at the Institution of Civil Engineers, Dr. W. Marcet, F.R.S., President, in the chair. Thirty-nine new Fellows were elected. The following papers were read:—(1) "Report of the Wind Force Committee on the Factor of the Kew Pattern Robinson Anemometer." This has been drawn up by Mr. W. H. Dines, who has made a large number of experiments with various anemometers on the whirling machine at Hersham. Twelve of these were made with the friction of the Kew anemometer artificially increased, seven with a variable velocity, and fourteen with the plane of the cups inclined at an angle to the direction of motion. In discussing the results, the following points are taken into consideration,—viz., the possibility of the existence of induced eddies, the effect of the increased friction due to the centrifugal force and gyroscopic action, and the action of the natural wind. The conclusion that the instrument is greatly affected by the variability of the wind to which it is exposed seems to be irresistible, and if so, the exact value of the factor must depend upon the nature of the wind as well as upon the mean velocity. There is evidence to show that during a gale the variations of velocity are sometimes of great extent and frequency, and there can be but little doubt that in such a case the factor is less than 2·15. The one point which does seem clear is, that for anemometers of the Kew pattern the value 3 is far too high, and consequently that the registered wind velocities are considerably in excess of the true amount. (2) "On Testing Anemometers," by Mr. W. H. Dines, B.A. The author describes the various methods employed in the testing of anemometers, points out the difficulties that have to be encountered, and explains how they can be overcome. (3) "On the Rainfall of the Riviera," by Mr. G. J. Symons, F.R.S. (4) "Report on the Phenological Observations for 1889," by Mr. E. Mawley.

The English Iron Trade.—Owing partly to the habitual abstention from business on the approach of the holidays and the close of the year, but also partly to the unwillingness of manufacturers to contract forward on the basis of prices which they consider do not represent the actual state of the market, trade has been quieting down during the past week, and will probably not revive before the new year. At the same time, a very steady tone is maintained in all departments, due to the fact that makers are not in want of work for a considerable time ahead. The pig-iron business has been rather quiet, and even speculators in warrants are holding off the market. Scotch warrants have not fluctuated much, but makers are still doing a fair business. What trade there is passing at present in Cleveland iron is done mostly by second-hand holders, who are offering their iron, which they probably bought cheaply, at 60s. 6d. to 61s., while makers quote up to 65s. for No. 3, both for prompt and forward delivery. Although business in pig-iron in other districts is limited, prices remain as strong as they were. There is no change in the hematite trade, either as regards demand or prices; but this much is certain, that the market is firm, and prospects are good. Manufactured iron and steel are fairly active, and values are steady. Shipbuilders and engineers continue active.—*Iron.*

The Strike of Brickmakers at Shoebury.—We are informed that the strike at the Shoebury brickfields, belonging to Messrs. Eastwood & Co., Limited, has ended. The men, who have been paid (Messrs. Eastwood say) 30 per cent. more than the Kent brickmakers, struck for double the advance which had been given to the Kent men. A deputation of the men saw Mr. Wragge, the company's manager, on Monday last, and stated that the men would be willing to resume work on Messrs. Eastwood & Co.'s terms. Mr. Wragge informed the men that on this understanding he would be willing to re-open the field. The strike has lasted over ten weeks. It is stated that it was in a great measure fomented by political agitation, but into this matter we cannot enter. It has caused great suffering, and has stopped for a time the making of a brick ("D K" brand), well-known in the London market.

Royal Society of Painter-Etchers.—The next Exhibition will be opened on Saturday, March 1. The election of Associates will take place on February 6 previously.

PRICES CURRENT OF MATERIALS.

TIMBER.	£. s. d.	£. s. d.
Greenheart, B.G. ....ton	7 0 0	7 15 0
Teak, E.I. ....load	12 0 0	14 0 0
Sequoia, U.S. ....foot cube	0 2 8	0 3 0
Canada ....load	3 0 0	4 5 0
Birch ,, ...load	3 0 0	4 15 0
Elm ,, ...load	3 10 0	4 15 0
Fir, Dantzic, &c. ....load	3 0 0	3 10 0
Oak ,, ...load	3 10 0	4 10 0
Canada ....load	5 10 0	7 0 0
Pine, Canada red ....load	2 10 0	3 10 0
,, yellow ....load	3 0 0	5 5 0
Lath, Dantzic ....fathom	4 10 0	5 10 0
St. Petersburg ....fathom	5 0 0	6 10 0
Wainscot, Riga, &c. ....log	0 0 0	0 0 0
Deals, Finland, 2nd and 1st...std. 100	9 10 0	11 0 0
Riga ,, 4th and 3rd...std. 100	7 0 0	8 0 0
,, yellow ....std. 100	7 0 0	9 0 0
St. Petersburg, 1st yellow ....std. 100	11 0 0	14 0 0
,, 2nd ,, ...std. 100	9 0 0	10 10 0
,, white ....std. 100	8 10 0	10 0 0
Swedish ....std. 100	7 10 0	10 0 0
White Sea ....std. 100	9 0 0	17 0 0
Canada, Pine, 1st ....std. 100	16 0 0	26 0 0
,, ,, 2nd ....std. 100	11 0 0	17 10 0
,, ,, 3rd, &c. ....std. 100	8 0 0	10 10 0
,, Spruce, 1st ....std. 100	9 0 0	11 0 0
,, ,, 3rd and 2nd ....std. 100	7 0 0	9 0 0
New Brunswick, &c. ....std. 100	6 0 0	8 10 0
Battens, all kinds ....std. 100	6 0 0	17 0 0
Flooring Boards, sq., 1 in., prepared, First ....sq.	0 11 0	0 14 0
Second ....sq.	0 8 0	0 10 6
Other qualities ....sq.	0 6 0	0 7 9
Cedar, Cuba ....foot	0 0 4	0 0 5
Honduras, &c. ....foot	0 0 4	0 0 4½
Mahogany, Cuba ....foot	0 0 5	0 0 6½
St. Domingo, cargo average ....foot	0 0 5	0 0 6½
Mexican, cargo average ....foot	0 0 4½	0 0 5½
Tobasco ,, ...foot	0 0 5½	0 0 6½
Honduras ,, ...foot	0 0 5½	0 0 6½

TIMBER (*continued*.	£. s. d.	£. s. d.
Box, Turkey ....ton	4 0 0	12 0 0
Rose, Rio ....ton	15 0 0	20 0 0
Bahia ....ton	14 0 0	18 0 0
Satin, St. Domingo ....foot	0 0 9	0 1 3
Porto Rico ....foot	0 0 10	0 1 6
Walnut, Italian ....foot	0 0 4½	0 0 6½
METALS.		
IRON—Bar, Welsh, in London...ton	7 15 0	8 5 0
,, at works in Wales ...ton	7 5 0	7 15 0
,, Staffordshire, in London ...ton	8 10 0	9 10 0
COPPER—		
British, cake and ingot ....ton	55 0 0	56 0 0
Best selected ....ton	57 0 0	58 0 0
Sheets, strong ....ton	66 0 0	67 0 0
Chili, bars ....ton	49 0 0	0 0 0
YELLOW METAL ....lb.	0 0 5½	0 0 6
LEAD—Pig, Spanish ....ton	14 2 6	0 0 0
English, com. brands ....ton	14 2 6	0 0 0
Sheet, English ....ton	16 5 0	16 10 0
TIN—Banca ....ton	100 0 0	0 0 0
Billiton ....ton	99 0 0	0 0 0
Straits ....ton	98 5 0	0 0 0
Australian ....ton	97 10 0	0 0 0
English Ingots ....cwt.	102 0 0	0 0 0
Bars ....cwt.	103 0 0	0 0 0
Refined ....cwt.	104 0 0	0 0 0
OILS.		
Linseed ....ton	20 10 0	20 15 0
Cocoanut, Cochin ....ton	26 10 0	0 0 0
Ceylon ....ton	23 10 0	23 15 0
Palm, Lagos ....ton	25 10 0	0 0 0
Rapeseed, English pale ....ton	34 0 0	0 0 0
,, brown ....ton	32 10 0	0 0 0
Cottonseed, refined ....ton	21 15 0	0 0 0
Tallow and Oleine ....ton	21 0 0	40 0 0
Lubricating, U.S. ....gall.	0 10 0	0 10 0
,, refined ....gall.	0 7 0	0 12 0
TAR—Stockholm ....barrel	1 0 0	0 0 0
Archangel ....barrel	0 15 0	0 15 0

COMPETITIONS, CONTRACTS, & PUBLIC APPOINTMENTS.

Epitome of Advertisements in this Number.

COMPETITIONS.

Nature of Work.	By whom Required.	Premium.	Designs to be delivered.	Page
New Baths, Winter Gardens, &c.	Harrogate Corporation	150*l.* 100*l.* 75*l.* & 50*l.*	Mar. 1st	i.
New Police Buildings	South Shields Corpn.	Not Stated.	Mar. 15th	ii.

CONTRACTS.

Nature of Work or Materials.	By whom Required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Works at Schools, Hanwell	Central London School District	Jarvis & Son	Jan. 6th	xii.
Sewerage Works	Barnet R. S. A.	— Mansbridge	Jan. 8th	ii.
Removal of Dust and Slop	St. George the Martyr Vestry	*Official*	Jan. 14th	xii.
Works and Materials (one year)	Liverpool Corporation	do.	Not stated.	xii.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.	Page.
City Engineer	Liverpool Council	850*l.*	Dec. 27th	xvii.
Chief Surveyor of Main roads	Stafford C. C.	800*l.*	Jan. 8th	xvii.

TENDERS.

[Communications for insertion under this heading must reach us *not later than* 12 *noon on Thursdays.*]

CANNING TOWN.—For road and sewer works on the Canning Town Estate, for the United Land Company, Limited, 33, Norfolk-street, Strand, London, W.C.:—

J. Cook, Spalding	£1,695 10 0
J. W. & J. Neave, Woodford	1,688 0 0
R. Wilson, Walthamstow	1,665 0 0
J. Garton, Stamford-hill	1,658 3 4
G. G. Rutty, Bromley-by-Bow	1,499 0 0
E. & W. Iles, South Wimbledon	1,435 0 0
L. Bottoms, Upper Tooting	1,391 0 0
R. Mayo, Brixton	1,345 0 0
S. Saunders, Fulham	1,338 8 9
J. Jackson, Leyton	1,333 0 0
J. Adams, Kingsland	1,265 0 0
G. Bell, Tottenham	1,233 0 0
Holme & King, Canning Town	1,176 2 10
J. Jackson, Plaistow (accepted)	1,100 0 0

LONDON.—For works in repairing, painting, &c., at the St. Olave's Union Offices, Tanner-street, Bermondsey, for the Guardians of St. Olave's Union. Messrs. Newman & Newman, architects, 31, Tooley-street, London-bridge, S.E.:—

Randall, W. K.	£195 0 0*
Mills, W. & E.	150 0 0
North, D.	135 0 0
Lilly, W. G.	134 0 0
Castle, W. & H.	124 0 0
Furniss, W.	120 10 0
Williams, H. J.	117 0 0
Wenborn, G. T.	116 0 0
Humphrey, T.	98 10 0
Knight, J.	97 0 0
Edwards, E., jun.	95 0 0
Rhodes, C.	90 10 0
Miles, D.	84 10 0
Godson, G., & Son	75 0 0
Bullers, J.	69 0 0
Wales, G.	66 2 0
Bellchamber, C. W., & Son	59 18 0
Stewart & Co.*	57 13 6

* Accepted subject to inquiry.

LONDON.—For alterations to drainage and sanitary works and fittings at the Rotherhithe Infirmary, for the Guardians of St. Olave's Union. Messrs. Newman & Newman, architects, 31, Tooley-street, London Bridge, S.E.:—

Christie, J. & C.	£736 0 0*
Lilly, W. G.	613 0 0
Bolding, J., & Son	590 0 0
Bullers, J.	580 0 0
Edwards, E., jun.	505 0 0
Randall, W. K.	500 0 0
Knight, J.	477 0 0
Castle, W. & H.	465 0 0
Aldridge & Pegg	450 0 0
Bellchamber, C. W., & Son	379 12 0
Godson, G., & Son*	361 0 0*

* Accepted subject to inquiry.

LONDON.—For sanitary fittings, &c., underground convenience, Broadway, Hammersmith, W. Mr. H. Mair, C.E., surveyor:—

G. Jennings	£286 15 0
H. G. Heywood	264 10 0
B. Finch & Co.	246 2 0
Doulton & Co.	223 19 1

NOTTINGHAM.—For proposed Board School, Sneinton Side, Nottingham, for the Nottingham School Board. Mr. A. H. Goodall, architect, Nottingham. Quantities by the architect:—

John Hutchinson	£3,995 0 0
Enoch Hind	3,927 0 0
J. J. Adams	3,850 0 0
Gilbert & Gabbitass	3,834 15 0
Thos. Cuthbert	3,803 0 0
E. Green	3,780 0 0
Wheatley & Maule	3,780 0 0
J. Hodson & Son	3,774 0 0
James G. Thomas	3,769 0 0
S. Keeling	3,760 0 0
A. B. Clarke	3,671 0 0
Enoch Kent	3,650 0 0
J. H. Clarke	3,637 0 0
J. Turton	3,600 0 0
F. Wartnaby	3,500 0 0
Barlow & Whittaker	3,498 0 0
James Wright	3,398 14 0
John Ossroft	3,361 0 0
James F. Price	3,300 0 0
John Cooper (accepted)	3,234 13 0

LONDON.—For the erection of industrial dwellings, Southwark, second section in continuation of present buildings, for the trustees of the Hayes Estate. Messrs. Waring & Nicholson, architects. Quantities by Mr. H. Smith :—

Hall, Beddall, & Co.	£11,370 0 0
Mills Bros.	10,500 0 0
Hill, Higgs, & Co.	10,440 0 0
Martin Wells & Co.	10,000 0 0
Rider & Son	9,949 0 0
Ford & Sons	9,912 0 0
W. Smith	9,825 0 0

SOUTHAMPTON.—For 1,000 tons broken granite, delivered on Corporation Wharf, Southampton, for the Corporation :—

	Total amount.	s. d.
J. Fennings, London (Guernsey granite)	£675 0 0	or 13 6 per ton.
Mowlem & Co., London (Guernsey granite)	654 3 4	or 13 1 ,,
Stranger, Guernsey (Guernsey granite)	645 6 8	or 12 8½ ,,
Mannelle, A. & F., London (Guernsey granite)	608 6 8	or 12 2 ,,
Falla, P., Guernsey (Guernsey granite)	575 0 0	or 11 6 ,,
Skelton & Co., London (Guernsey granite)	541 13 4	or 10 10 ,,
Forny, Cherbourg (Cherbourg granite)*	495 16 8	or 9 11 ,,
Bull & Sons, Southampton (no description)	447 18 4	or 8 11½ ,,

* Accepted.

UPTON PARK (Essex).—For the erection of a block of school buildings and appurtenances to be known as "Elmhurst-road Schools," Upton Park, in the county borough of West Ham, for the West Ham School Board. Mr. J. T. Newman, architect, 2, Fen-court, Fenchurch-street, E.C. Quantities by Messrs. R. L. Curtis & Sons :—

	Buildings.	Foundations.
G. J. Hoskings	£15,478 0 0	£515 0 0
J. Hearle & Son	14,683 0 0	525 0 0
J. W. Wyles	14,138 0 0	590 0 0
J. W. Maddison	13,600 0 0	535 0 0
J. Catley	13,060 0 0	475 0 0
G. Sharp	12,900 0 0	500 0 0
J. Morter	12,810 0 0	427 0 0
Norton & Son	12,414 0 0	424 0 0
A. Reed (accepted)	12,299 0 0	399 0 0

WEST HAM.—For making up Connaught-road, for the Corporation of West Ham. Mr. Lewis Angell, M.Inst.C.E., Borough Engineer :—

Perry & Co.	£10,168 0 0
Holme & King	9,188 19 11
Ilen	9,761 0 0
Mowlem & Co.	9,497 0 0
Rutty	8,834 0 0
Neave	8,716 0 0
Bell	8,656 0 0
Jackson	8,612 0 0
Griffiths	8,592 0 0
Cook & Co.	8,574 0 0
Adams (accepted)	8,289 9 0

WEST HAM.—For the West Ham Main Drainage Extension Contract No. 6. Mr. Lewis Angell, M.Inst.C.E., Borough Engineer :—

Holme & King	£11,518 15 2
Neave	11,481 0 0
Perry	10,594 0 0
Reed	10,239 10 0
Adams	9,944 1 4
Bottoms	9,698 0 0
Bell	9,821 0 0
Cooks & Co.	9,426 11 5
Jackson*	8,900 0 0
Gentry	8,575 0 0

* Accepted.

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TO CORRESPONDENTS.

F. B. (not any danger worth considering in comparison with the advantage to a town of a nearly noiseless traffic).—W. A. B. (too late).—"Important Decision Under the Building Act" (no sender's name appended, and therefore cannot be inserted).—H. G. H. (we have not space to set out all the minutiæ of estimates for works under the head of "Tenders"; we can only give the totals. Nor do we insert anything for which the highest tender is less than 100*l.*)—C. M. S. (too late).

All statements of facts, lists of tenders, &c. must be accompanied by the name and address of the sender, not necessarily for publication.

We are compelled to decline pointing out books and giving addresses.

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Letters or communications (beyond mere news-items) which have been duplicated for other journals, are NOT DESIRED.

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Advertisements for the current week's issue must reach the Office before THREE o'clock p.m. on THURSDAY, but those intended for the front Page should be in by the same hour on WEDNESDAY.

SPECIAL.—ALTERATIONS IN STANDING ADVERTISEMENTS or ORDERS TO DISCONTINUE same must reach the Office before TEN o'clock on WEDNESDAY mornings.

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Asphalte.—The Seyssel and Metallic Lava Asphalte Company (Mr. H. Glenn), Office, 42, Poultry, E.C.—The best and cheapest materials for damp courses, railway arches, warehouse floors, flat roofs, stables, cow-sheds, and milk-rooms, graneries, tun-rooms, and terraces. [ADVT.

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